

OBG | There's a way

September 6, 2017

Mr. Todd Gmitro

Project Manager, Remediation and Reuse Branch Corrective Action Section 1 U.S. Environmental Protection Agency, Region 5 77 West Jackson Boulevard Mail Code: LU-9J Chicago, IL 60604-3507

RE: GE Aviation – Evendale, OH

Updated Groundwater EI Documentation (CA 750)

FILE: 612/64761

Dear Mr. Gmitro

In August 2013, O'Brien & Gere Engineers, Inc. (OBG) submitted documentation to the U.S. Environmental Protection Agency (USEPA) on behalf of General Electric Company (GE) supporting the Resource Conservation and Recovery Act (RCRA) Corrective Action Environmental Indicator (EI) - *Migration of Contaminated Groundwater Under Control* (CA750) for the GE Aviation facility in Evendale, OH. Documentation included the completed EI guidance form as well as statistical trends and graphical analysis derived using the Monitoring and Remediation Optimization System (MAROS) software developed by GSI Environmental. In August 2014, USEPA requested supplemental isoconcentration contour maps to further support the conclusions regarding stable or shrinking plumes at the facility. A technical memorandum with the requested isoconcentration contour maps was submitted to USEPA in December 2014. Minor revisions were made to the December 2014 technical memorandum, and the revised technical memorandum was included in the Corrective Measures Study (CMS) Report (OBG, 2017) as Appendix C – Groundwater Corrective Measures Objectives (CMOs).

The CMS Report was submitted to USEPA on July 6, 2017 and a follow up meeting with USEPA was held on August 2, 2017. As a result of discussions during that meeting, GE has prepared an update to the 2013 EI submittal, including statistical trends and graphical analysis using MAROS and isoconcentration maps to include groundwater monitoring data through early 2017. The EI documentation form has been updated accordingly, and is provided as an attachment to this letter in redline/strikeout format (Attachment A). MAROS statistical and trend analyses have also been updated and included as an attachment to the updated EI document (Attachment B).

As mentioned above, the isoconcentration maps and technical memorandum included in the CMS Report have been updated to include groundwater monitoring data collected in late 2016 as well as time-series concentration graphs through early 2017. A complete set of isoconcentration maps and time-series graphs for the Perched zone, Upper Sand & Gravel (USG), and Lower Sand & Gravel (LSG) are attached. The following provides summary notes to facilitate review of the attached isoconcentration maps and time-series graphs.

INTRODUCTION

The overall extent of impacted groundwater in the Perched zone, USG, and LSG units is stable or decreasing, as evidenced by stable or decreasing: 1) total mass of the plumes, 2) center of mass of the plumes and 3) most individual well concentrations. Information supporting this conclusion is presented in the attached August 2017 Updated Migration of Contaminated Groundwater Under Control EI Determination (RCRA Info Code (CA750)).







The attached figures provide isoconcentration maps for the plumes in each of the units for the semi-annual sampling events from the fourth quarter (4Q) of 2007, 2009, 2011 2013, and 2016. A 2007 map was not prepared for the Perched zone due to insufficient data coverage. These figures are provided as a supplement to the Updated August 2017 EI to aid in the two-dimensional visualization of the plumes to support the EI conclusions that the plumes are stable or decreasing in the Perched, USG and LSG units. There are several associated notes:

- The number of wells included in contouring varies between 2007 and 2016 as a result of additional off-site investigations in 2009 and the number of wells sampled during the particular quarterly event. The interpreted extent of isoconcentration contours is a function of the amount and location of available data. Temporal analysis based on an increasing number of data locations should not necessarily be interpreted as an increase in the extent of groundwater isoconcentration contours over time.
- Total chlorinated volatile organic compound (CVOC) concentrations are mapped under the assumption of a single plume for the purposes of simplification and temporal comparisons. However, it is noted that dissolved VOCs in the USG and LSG are likely to have a much more complex origin, including older releases during periods of higher historical pumping rates and drawdown, the presence of a mixed or co-mingled plume(s) from a potential upgradient source(s), differing compound degradation rates, or a combination of these. In addition, due to the likelihood that groundwater concentrations at well OSMW-5D represent a separate or co-mingled plume, data from well OSMW-5D were not included in the isoconcentration contouring.
- The IRM groundwater extraction system was started in July 2011with full operation of the extraction wells by December 2011. The 2011, 2013, and 2016 isoconcentration maps show the extraction well capture zones. Variability in CVOC concentrations at selected wells is estimated to be associated with some shifting of groundwater flow directions due to IRM pumping.

Additional support is provided by the attached 2Q 2017 time-series concentration graphs identified as **Figures 8**, **9** and **10**. These figures are provided to illustrate the general decreasing trends of the constituent concentrations within individual Perched, USG and LSG wells as a result of IRM pumping and natural attenuation.

DISCUSSION

The following highlights some of the key conclusions from a review of the isoconcentration maps and time-series concentration graphs for each of the water-bearing units (Perched Zone, USG, and LSG).

PERCHED ZONE

The isoconcentration maps for the Perched zone for 2009, 2011, 2013, and 2016 indicate an overall decreasing extent of the Perched zone plume, especially downgradient of the Perched zone extraction wells. Concentrations along the downgradient portion of the Perched zone plume have dropped from highs of over 1,700 μ g/L total CVOCs (4Q 2009 data) to 115 μ g/L (2Q 2017 data). Perched zone pumping appears to be redistributing higher concentrations within the central portion of the plume as evident by the concentrations at AF-24P and AF-25P, which increased during the 4Q 2012 and 1Q 2013, respectively, sampling events. CVOC concentrations in these two wells have since stabilized (see **Figure 8**). **Figure 8** illustrates that most of the Perched zone wells have decreasing trends and that concentrations in downgradient well H-221 have been relatively stable since 2007, with a more recent decreasing trend since 2Q 2014. Since concentrations at the nearest upgradient well (OSMW-10P) have exhibited a decreasing trend, groundwater concentrations at H-221 are anticipated to continue to decrease.

USG

The isoconcentration maps for the USG for 2007, 2009, 2011, 2013 and 2016 indicate an overall decreasing extent of the USG plume. In addition, the Perched zone pumping appears to have reduced concentrations along the eastern portion of the USG plume by continued vertical gradient reversal and capturing Perched zone constituents. Concentrations along the eastern portion of the USG plume have dropped from highs of over 3,700 μ g/L total



CVOCs (4Q 2009 data) to approximately 1000 μ g/L or less (2Q 2017 data). The southwestern portion of the USG plume near OSMW-8S appears relatively stable, especially for chloroethenes, and CVOC concentrations in upgradient well OSMW-6S have exhibited a significant decreasing trend (**Figure 9**). Based on these data trends, it is anticipated that the plume downgradient of OSWM-6S should continue to decrease over time. Similarly, the concentrations in OSMW-9S peaked in 2012, stabilized, and have since decreased. Concentrations in upgradient well OSMW-4S have decreased from highs of over 500 μ g/L total CVOCs (early 2011 [**Figure 9**]) to less than 25 μ g/L total CVOCs (4Q 2016 data), and the overall size of the USG plume has remained stable along the western portion of the plume.

LSG

The isoconcentration maps for the LSG aquifer for 2007, 2009, 2011, 2013, and 2016 indicate an overall decreasing extent of the LSG plume. Concentrations within the LSG plume have dropped from highs of over 1,500 μ g/L total CVOCs (4Q 2007 data) to generally less than 800 μ g/L, as indicated by decreasing trends in groundwater from wells OSMW-1D, OSMW-3D, PMW-3D, and TMW-2D (Figure 10). This decreasing trend in concentrations has resulted in a reduction of the mass of the LSG plume as presented in the original EI submittal. As noted above, LSG pumping may be modifying groundwater flow directions and redistributing concentrations within the LSG plume. This appears to be the case for concentrations at TMW-2D, which increased during the 4Q 2012 sampling, and have remained at approximately 800 μ g/L. In addition, concentrations increased in OSMW-3D during the 2Q 2014 event, and have oscillated from below 50 μ g/L to approximately 500 μ g/L since. Figure 10 illustrates that most of the LSG wells have decreasing trends, except for OSMW-8D and OSMW-6D (vinyl chloride [VC] only). The concentrations in OSMW-8D increased since 2Q 2012 to near pre-pumping levels but decreased by approximately 50% during 2Q 2017 event. VC concentrations at OSMW-6D have fluctuated between approximately 50 μ g/L and 240 μ g/L (peaking in 4Q 2015) since IRM pumping began (Figure 10). Despite these exceptions, the overall size and mass of the LSG plume have decreased over the period of monitoring.

CLOSING

Additional documentation for the RCRA Corrective Action EI Determination, *Migration of Contaminated Groundwater Under Control* (CA750), for the GE Aviation facility in Evendale, OH (OBG, 2013, Updated August 2017) is included in Attachment A. Supporting statistical and trend analyses are provided in Attachment B.

If you need additional information or have any questions, please contact Ed Kolodziej of GE at 610-992-7981 or me at 513-697-2026.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Richard L. Boone, CPG, CHMM

Managing Scientist

Attachments:

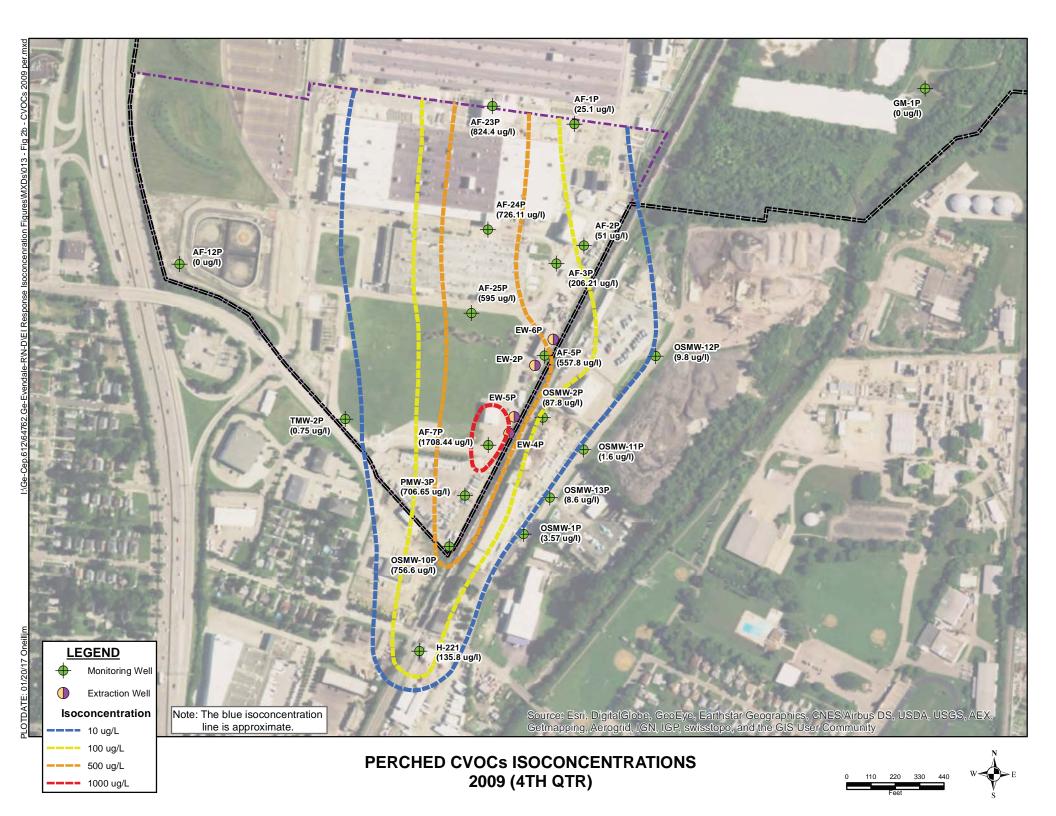
Figures

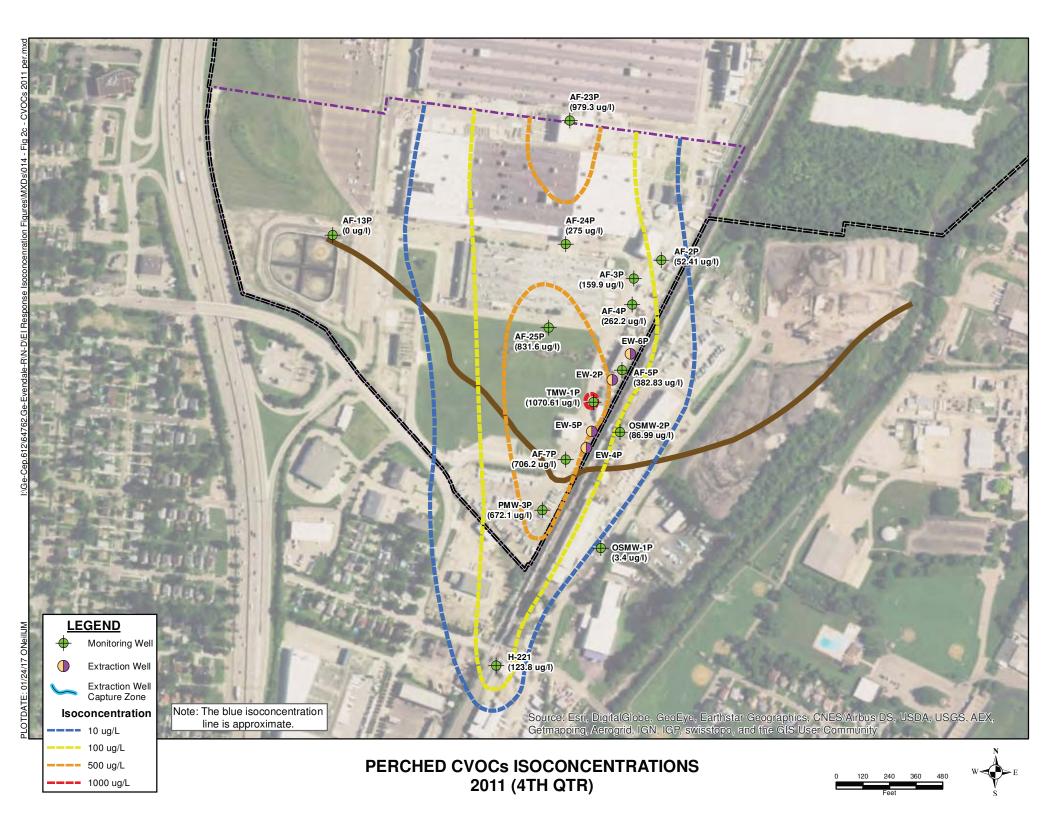
Attachment A – Updated Documentation of EI Determination – Migration of Contaminated Groundwater Under Control (CA 750)

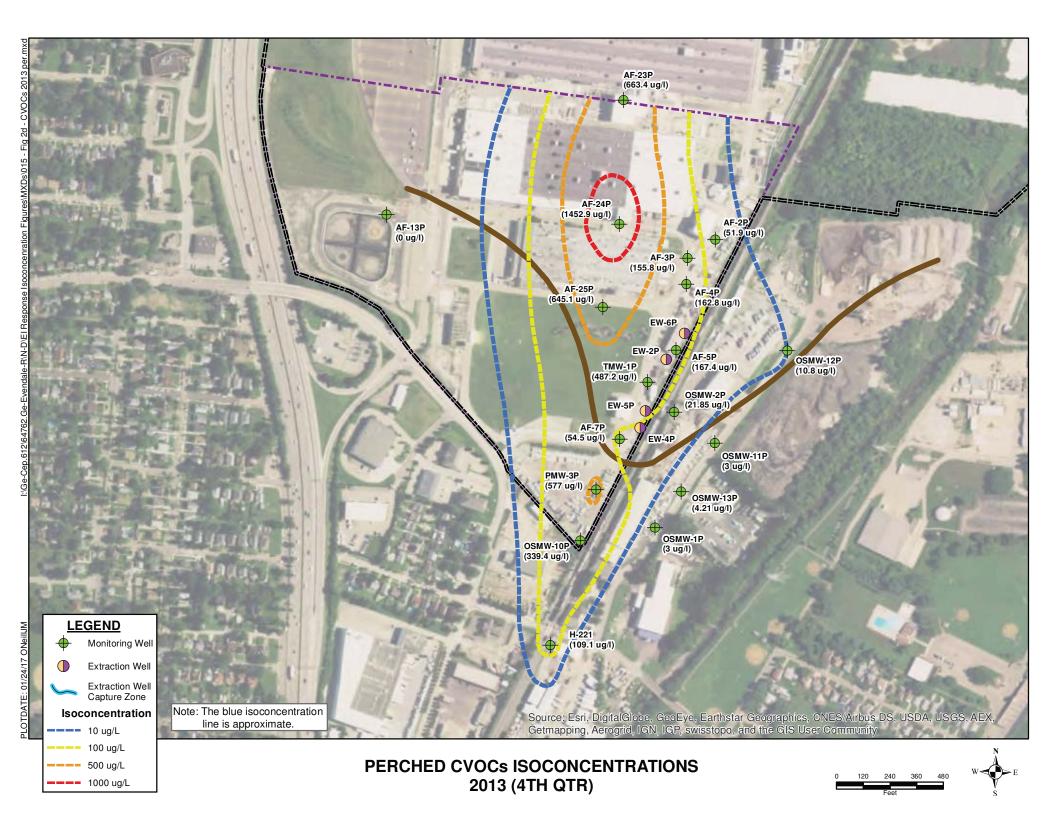
Attachment B – Updated EI Determination – Supporting Statistical and Trend Analysis with MAROS Summary

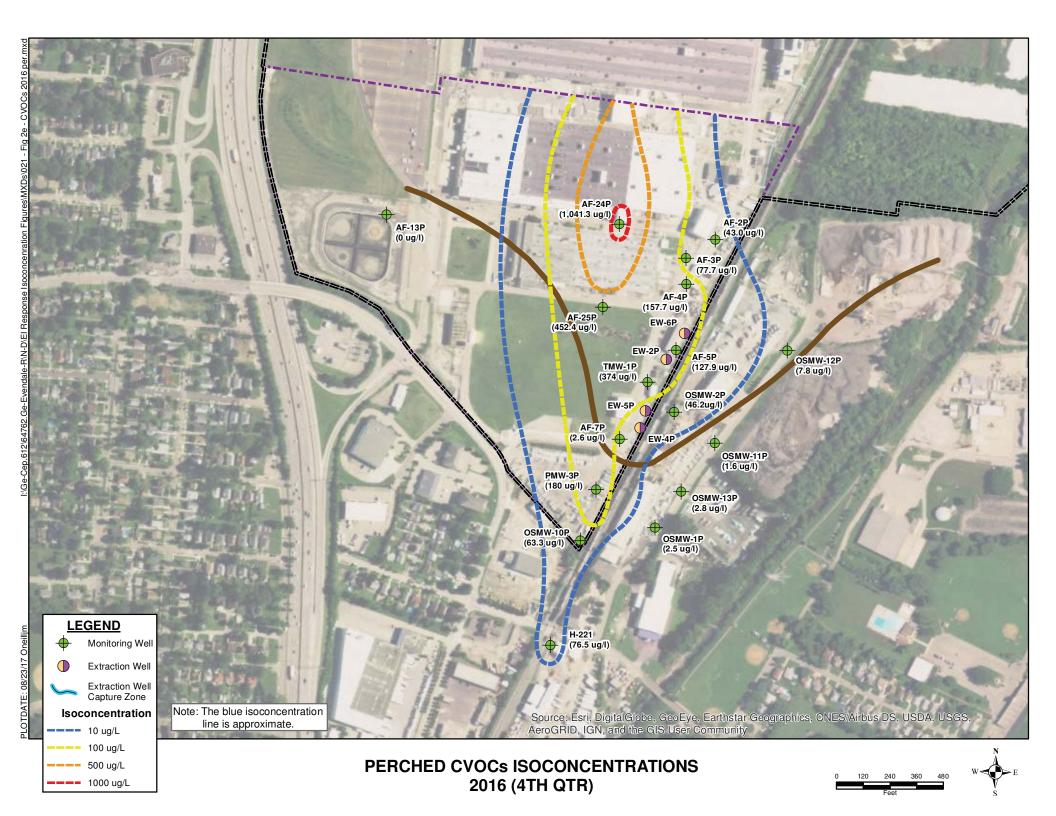


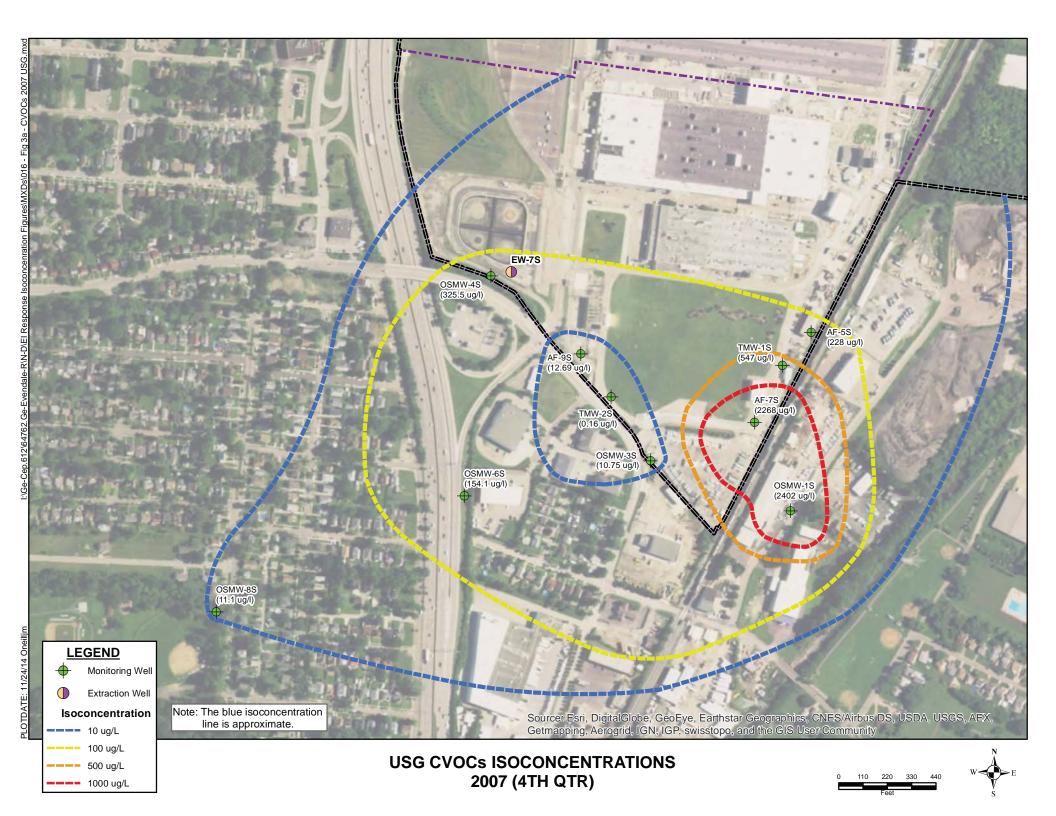


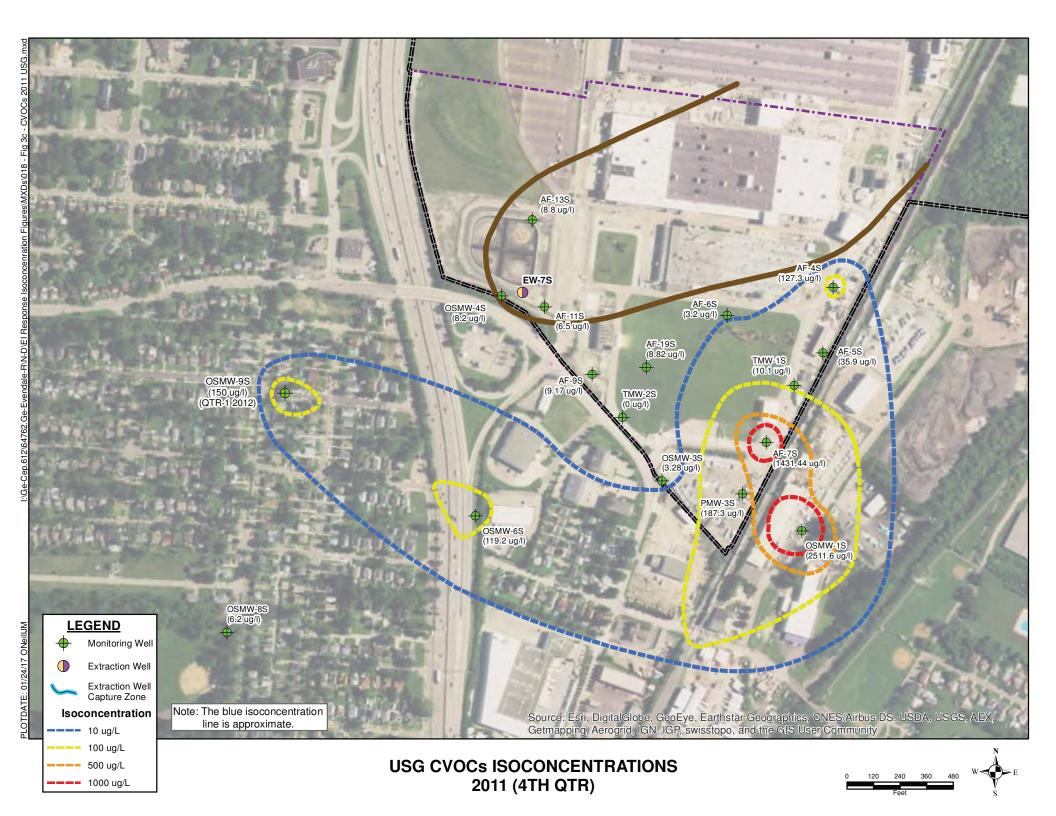


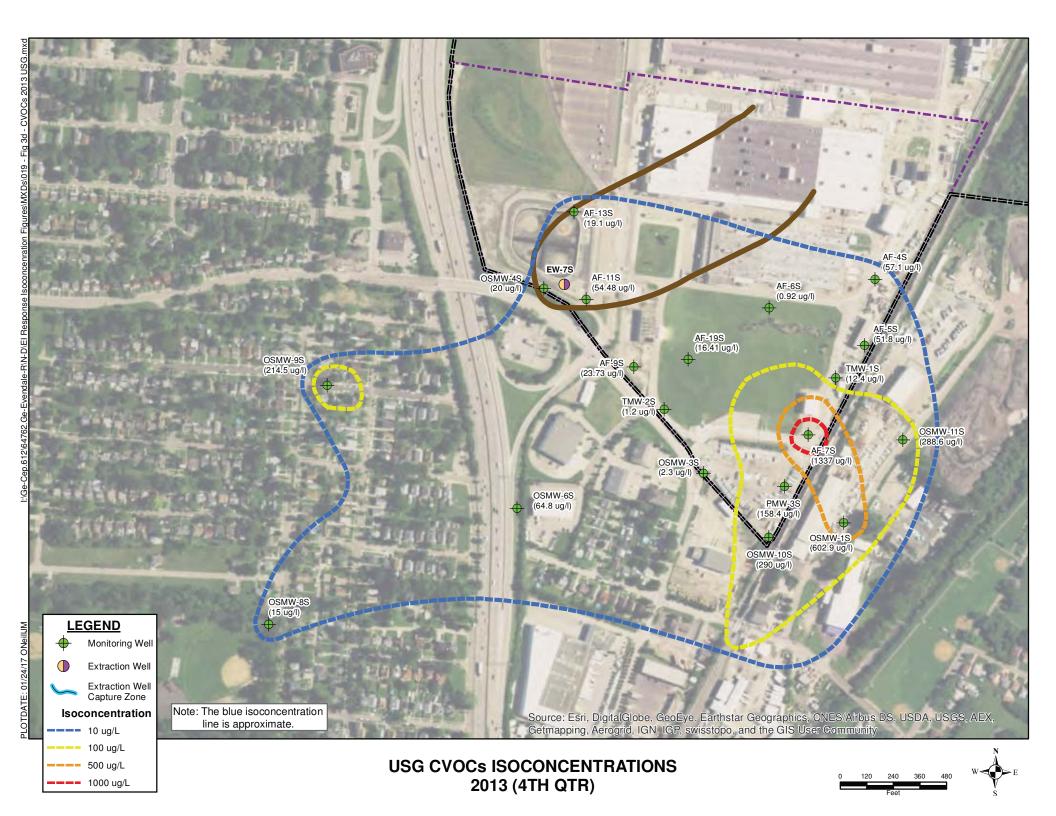


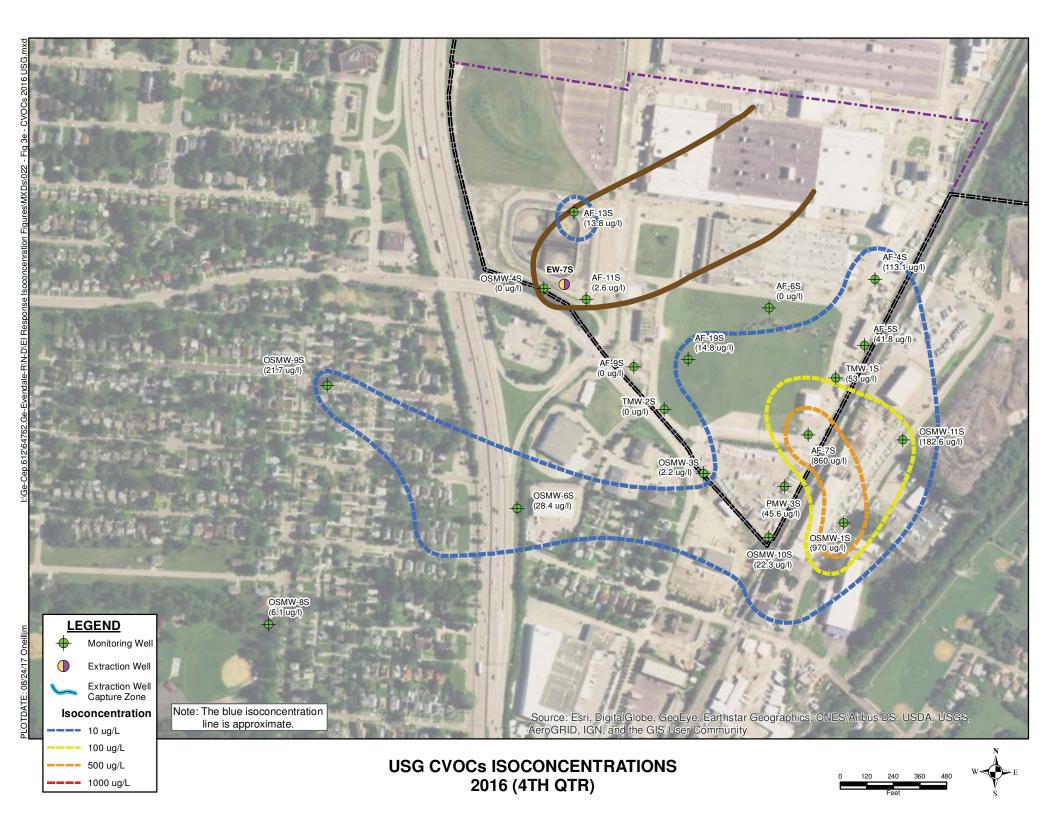


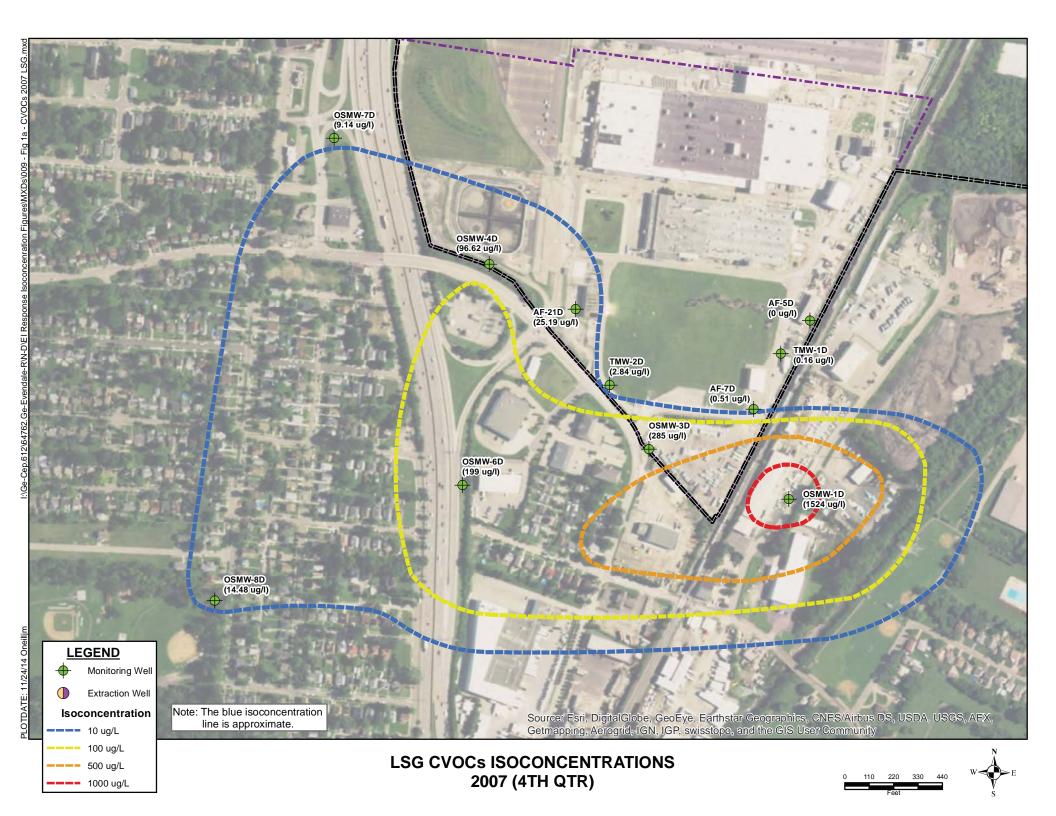


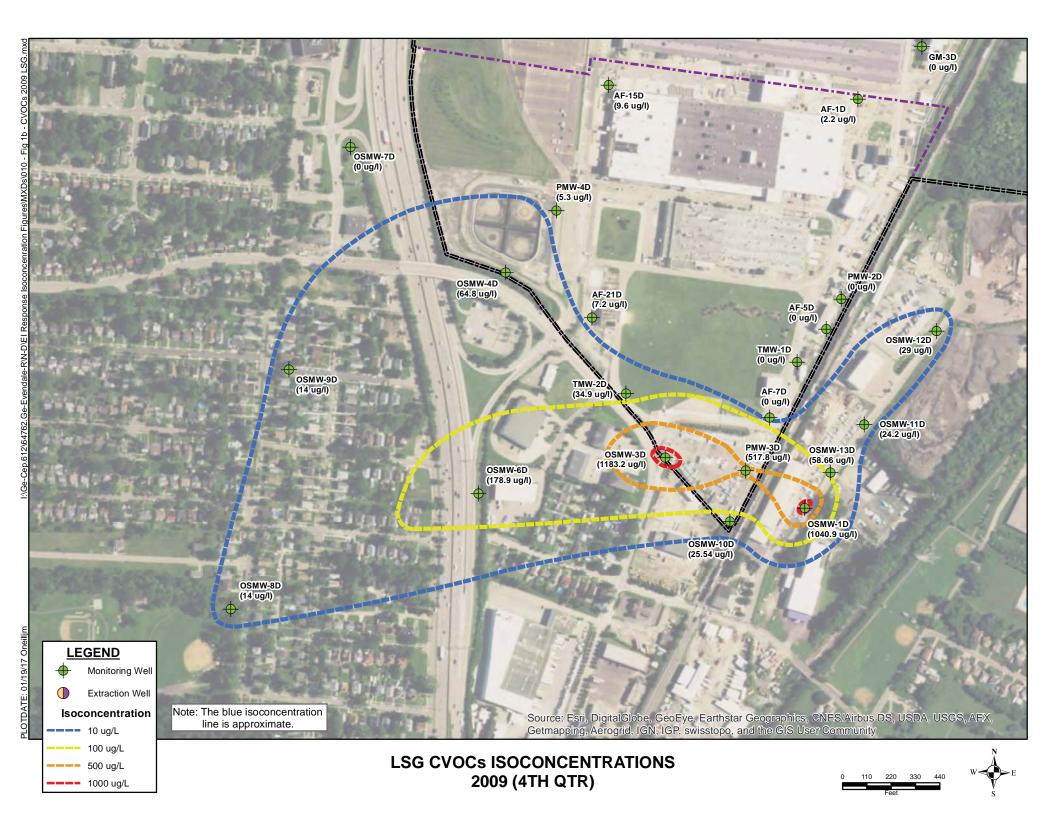


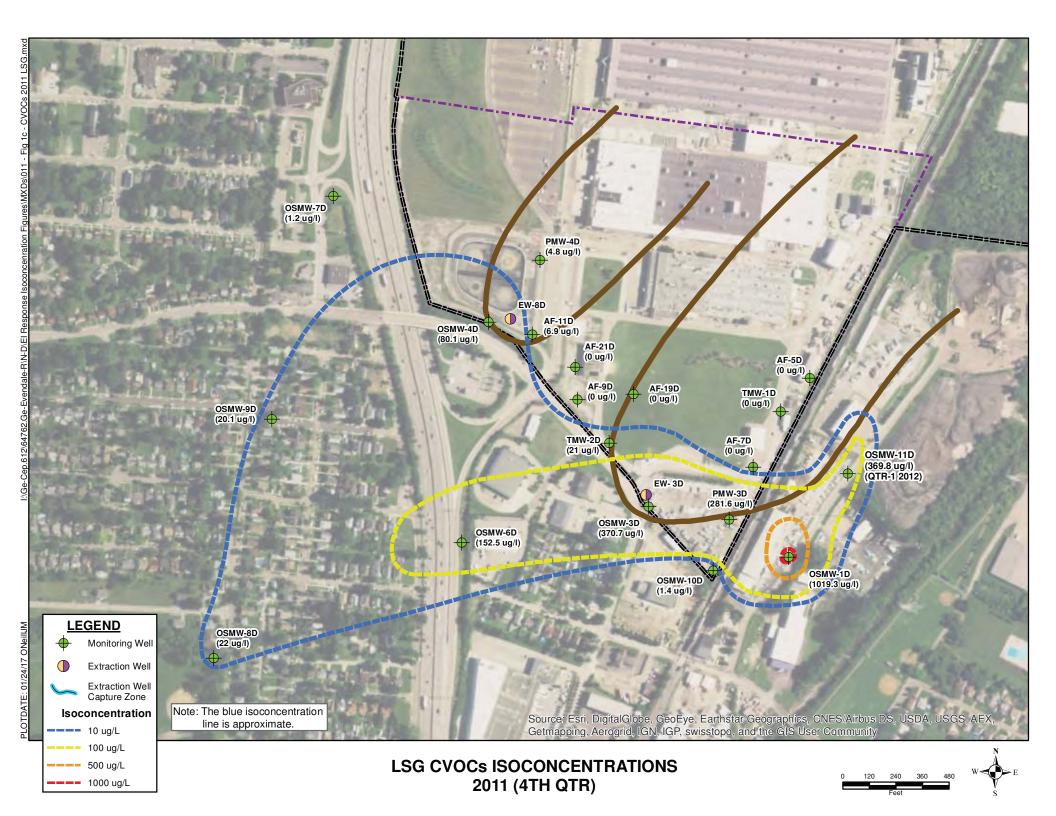


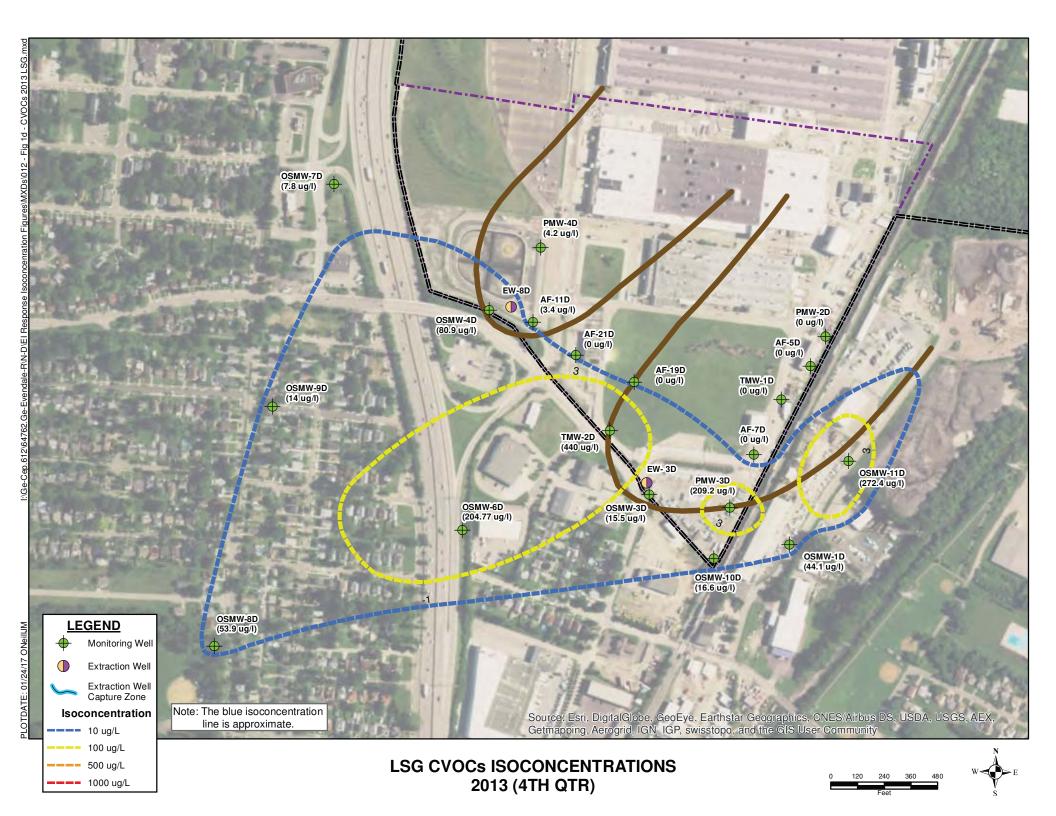


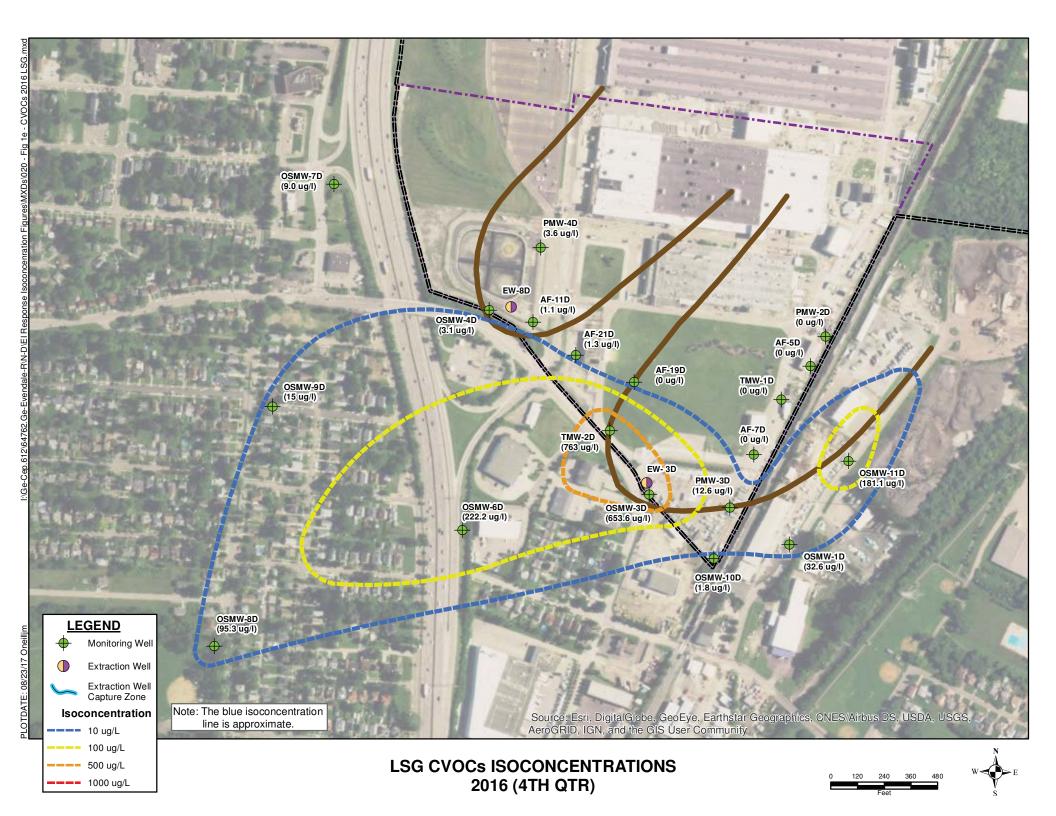


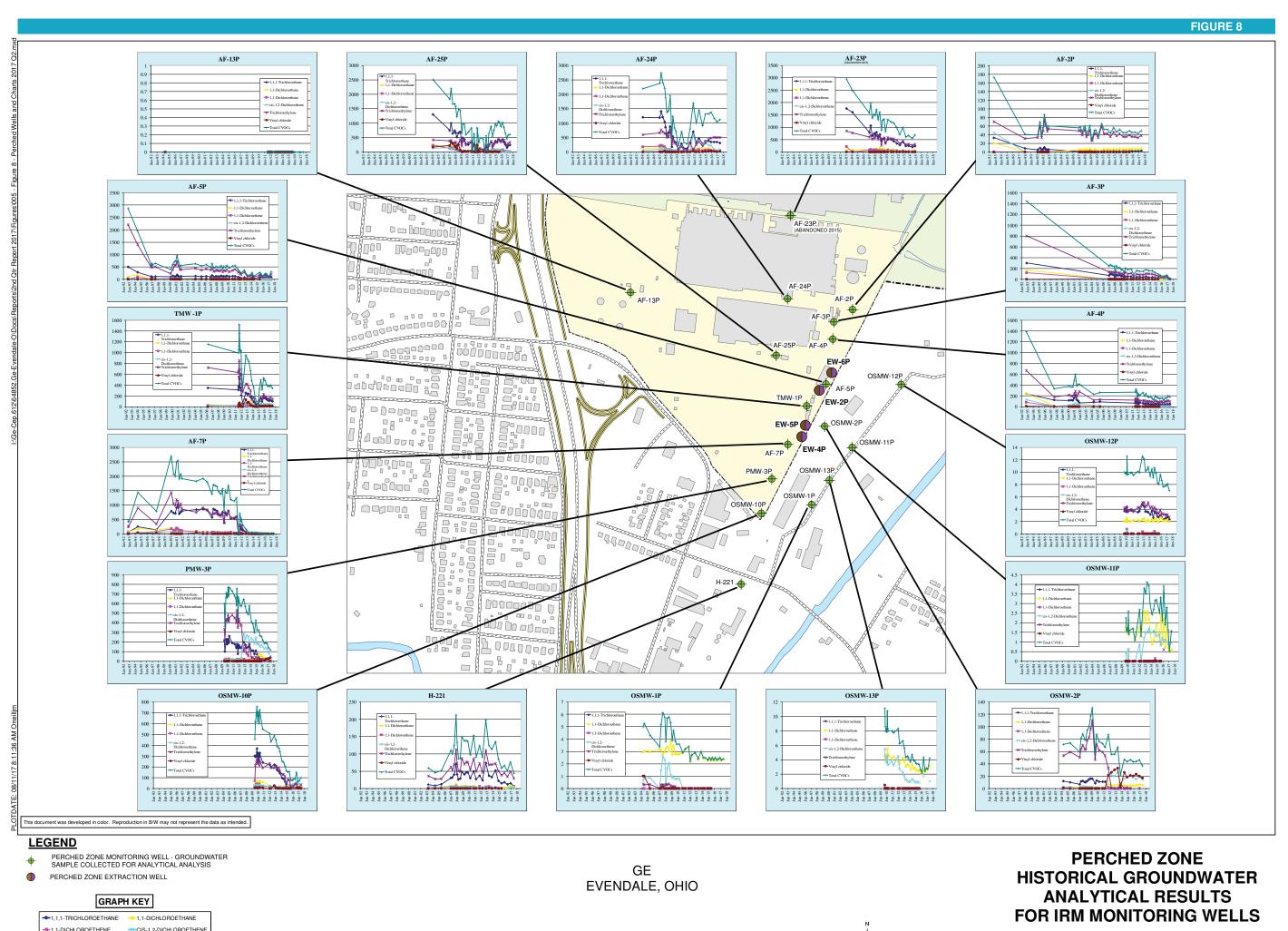












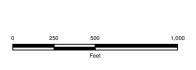


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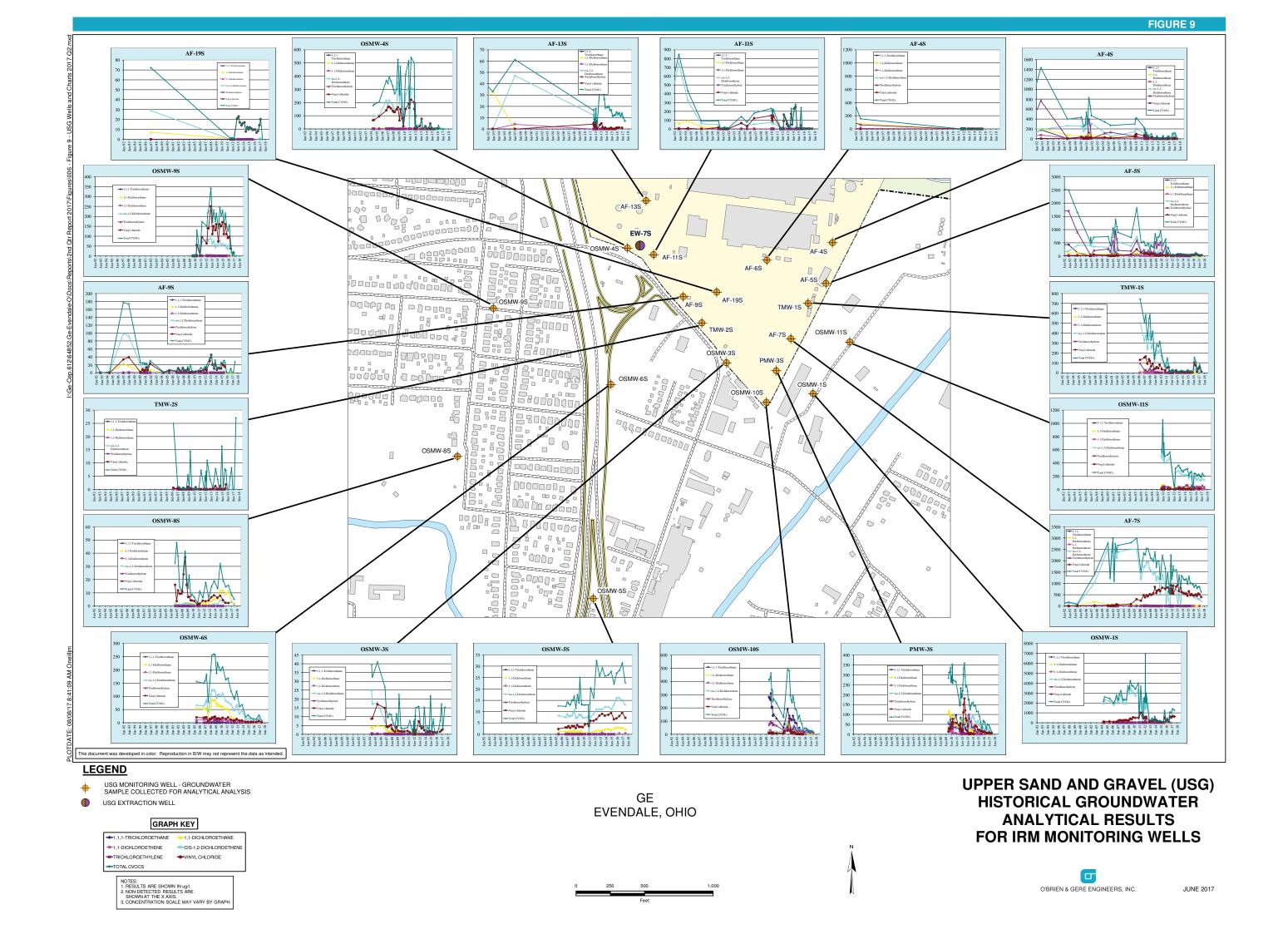
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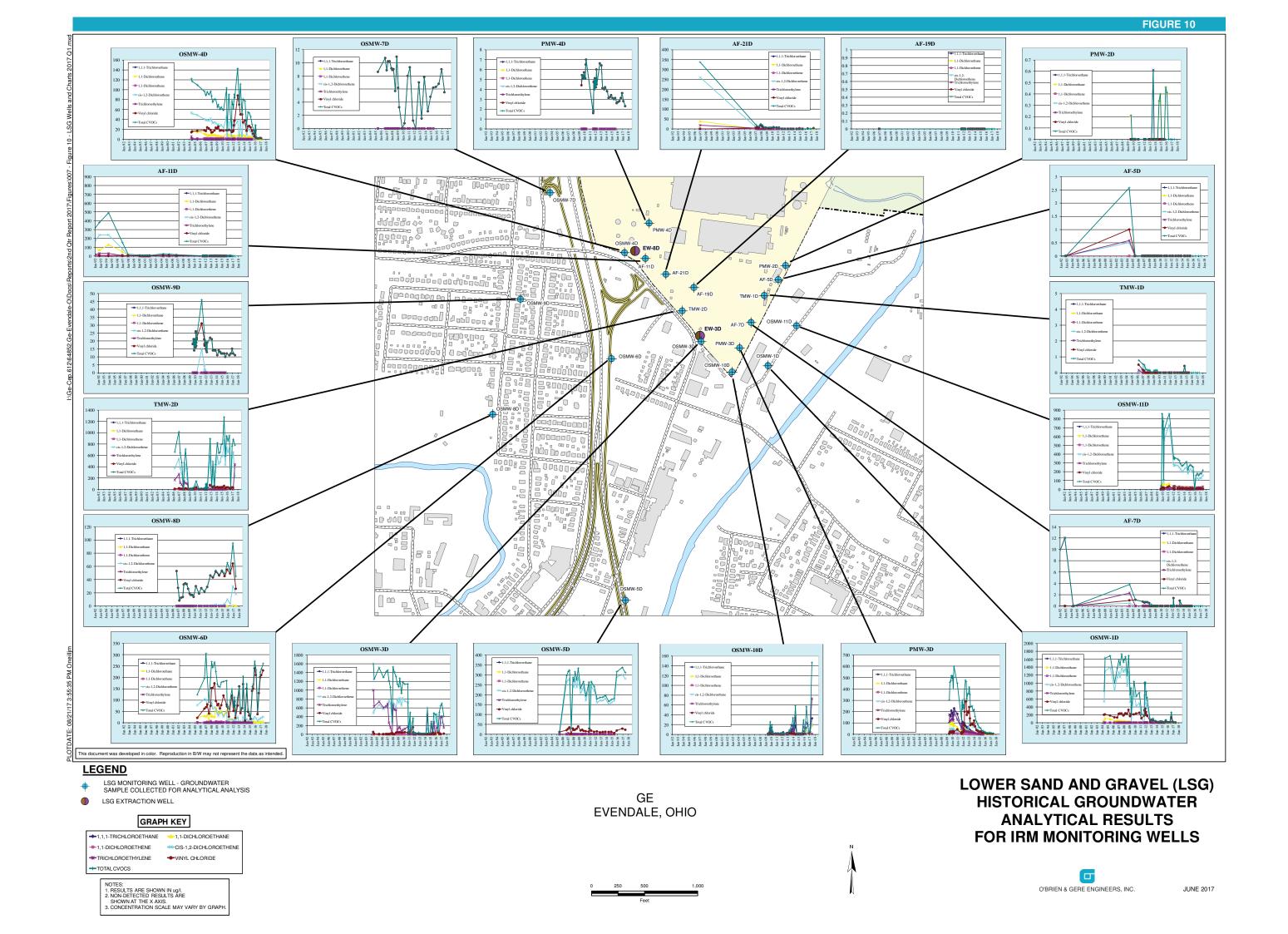
2. NON-DETECTED RESULTS ARE SHOWN AT THE X AXIS.

3. CONCENTRATION SCALE MAY VARY BY GRAPH.









Attachment A

Updated Documentation of Environmental Indicator Determination

Migration of Contaminated Groundwater Under Control (CA 750)

Documentation of Environmental Indicator Determination in accordance with EPA Interim Final Guidance 2/5/99

RCRA Corrective Action **Environmental Indicator (EI) RCRA Info Code (CA750)**

Migration of Contaminated Groundwater Under Control

Facility Name: General Electric Facility Address: One Neumann Way, Cincinnati, Ohio						
Facility EPA ID #: <u>OHD 000 817 312</u>						
releases to Waste Ma	ailable relevant/significant information on known and reasonably suspected to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid nagement Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), sidered in this EI determination?					
<u>X</u>	If yes - check here and continue with #2 below.					
	If no - re-evaluate existing data, or					
	If data are not available, skip to #8 and enter "IN" (more information needed) status code.					

BACKGROUND

<u>Definition of Environmental Indicators (for RCRA Corrective Action)</u>

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two Els developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An El for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" El

A positive "Migration of Contaminated Groundwater Under Control" El determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of El to Final Remedies

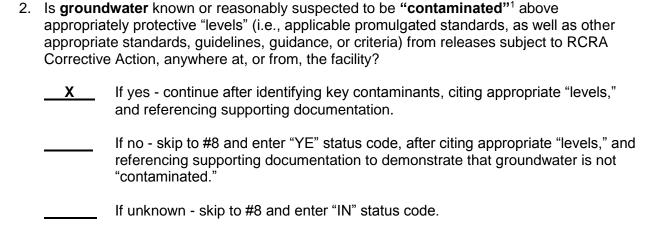
While Final remedies remain the long-term objective of the RCRA Corrective Action program the Els are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Migration of Contaminated Groundwater Under Control" El pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final

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remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of El Determinations

El Determination status codes should remain in RCRA Info national database ONLY as long as they remain true (i.e., RCRA Info status codes must be changed when the regulatory authorities become aware of contrary information).



Rationale and Reference(s): The basis for these determinations are the following references: RCRA Facility Investigation (RFI) Report by O'Brien & Gere, 1996; the Human Health Risk Assessment (HHRA) by ChemRisk, 1998, including Appendix D – Groundwater; the Source Area Investigation (SAI) report by O'Brien & Gere, 2008; Hydraulic Control Interim Remedial Measure (IRM) Work Plan by O'Brien & Gere, 2009; Groundwater IRM Engineering Design (or Basis of Design [BOD]) by O'Brien & Gere, 2009; and numerous groundwater reports by O'Brien & Gere issued in conjunction with the RFI; the latest being the First Quarter 2013 Quarterly Groundwater Monitoring Report (O'Brien & Gere, 2013). Each of these documents with the exception of the HHRA Appendix D, has been reviewed, commented, and accepted by the USEPA. In addition, we have referenced the Communication Area Site Investigation Report, March 1998 by Earth Tech, Draft Site Investigation Report for the Fuel Farm Investigation at Former Air Force Plant 36, April 2000 by Earth Tech, and the Former AFP 36 Supplemental Investigation Report, September 2004 by Earth Tech.

Since the initial submittal of this El documentation in 2013, additional documents have been prepared and submitted to USEPA: Corrective Measures Study (CMS) Work Plan (OBG, 2013), CMS Report (OBG, 2017) and Appendices.

The latest IRM groundwater monitoring report is the First Quarter 2017 Groundwater Monitoring Report (OBG, 2017).

Groundwater at the permittee's facility has identified contaminants or constituents of potential concern (COPCs, consisting of primarily chlorinated solvents and associated degradation products) at or above reference protective levels. Impacts have been identified at multiple sample locations within each of the three aquifers identified at the site. Please refer to Table

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4 of the most recent groundwater sampling report for a presentation, in table form, of the detected constituents during the last round of sampling.

Furthermore, the SAI report, IRM Work Plan, BOD and IRM quarterly groundwater monitoring reports provide a summary of the site conditions, hydrogeology, impacts at the site and potential source areas, as well as the influent concentrations for each extraction well for each quarter of IRM operation.

The most recent update of this information is provided in the CMS Report (OBG, 2017), in particular, Appendix C: Groundwater CMOs (which includes the Conceptual Site Model).

Footnote:

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

groundwater is expected to remain within "existing area of conteminated groundwater"?

3. Has the migration of contaminated groundwater stabilized (such that contaminated

0	ed by the monitoring locations designated at the time of this determination)?		
<u> </u>	If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination" ²).		
	If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination" ²) skip to #8 and enter "NO" status code, after providing an explanation.		
	If unknown - skin to #8 and enter "IN" status code		

Rationale and Reference(s): Multiple rounds of groundwater sampling have been completed at the site. This sampling has consistently identified stable or decreasing concentrations of the primary chlorinated contaminants of concern and the formation of associated degradation products. The nature and extent of the groundwater contamination has been established through the approved RFI, subsequent rounds of groundwater well monitoring and additional investigations. Therefore, designation of "Yes" has been used to recognize the stability and plume definition established for the groundwater based on the approved RFI and ongoing groundwater quality sampling and investigations.

Below is a review of the physical evidence and understanding of the environmental conditions.

DISSOLVED PHASE CONTAMINATION

Horizontal Migration

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The attached El Determination documentation (annotated bullet summary, Monitoring and Remediation Optimization Software [MAROS, AFCEE 2006] output and supporting graphs of MAROS data) is provided to support this El submittal. The attached documentation is updated with groundwater monitoring data collected through 2017. The groundwater data for the last 12.8 years for the three aquifers at the site (Perched, Upper Sand and Gravel (USG), and Lower Sand and Gravel [LSG] Aquifers) were evaluated utilizing the Mann-Kendall and linear regression statistical trend analysis techniques (on individual well data), and was further evaluated using MAROS to evaluate the mass, center of mass and longitudinal and horizontal spread of the primary COPCs within the plume in each aquifer, as represented by total ethane mass concentrations (in mol/L) representing the total mass of 1,1,1-TCA (TCA) and its daughter products (1,1-DCA, 1,1-DCE and chloroethane) (i.e., TCA Group) and total ethene mass concentrations (in mol/L) representing the total mass of TCE and its daughter products (cis- and trans-1,2-DCE and vinyl chloride) and PCE (i.e., TCE Group).

As outlined in the El Determination Evaluation Bullet Summary, there were several challenges in the evaluation of the data; however, this evaluation is indicative of the plume stability observed at the site. The concentrations of the primary chlorinated solvent COPCs have been observed to be decreasing within each of the aquifer plumes overall. The mass of constituents within the plumes have also been observed to be decreasing overall. Similarly, the center of mass (i.e., distance from the source) of the constituents within each of the three aquifer's plume have also been moving back toward the source areas identified at the site (i.e., decreasing) overall. The overall length (longitudinal spread) and width (horizontal spread) of the plumes have been shrinking or at least staying within the already known impacted zones within the aquifers at the site.

Furthermore, the substantial concentrations of breakdown products of the chlorinated solvent parent products (1,1,1-trichloroethane [TCA] and trichloroethene [TCE]) have been observed and indicates degradation of the parent products, which provides additional confirmation for the reduction in mass and attenuation of COPCs at the site. The extent of impact at the site has been consistent over time. Additional data supporting these observations are also found in the reference reports identified per Item 1. Ongoing monitoring of the groundwater quality will continue to confirm the stability of the plume in each of the three aquifers at the site. In addition, the operation of the IRM at the site will further reduce the mass of COPCs at the site, and will contribute to maintenance of plume stability and to decrease of plume mass.

The remedial time frame to achieve the long-term groundwater cleanup goal of MCLs is estimated to be greater than 30 years due to the presence of highly heterogeneous subsurface conditions, CVOC-impacted fine-grained materials at depths of 60 feet or more, and back-diffusion of CVOCs from residual sources in less-permeable strata.

Vertical Migration

The RFI report identifies areas of vertical interconnection between aquifer units on site. One significant area is located near monitoring well AF-9D. This area was investigated separately by the USAF as reported in the March 1998 Communication Area Site Investigation Report. The findings of this report confirm a vertical component to groundwater flow in this area. However, the magnitude of the vertical communication pathway in the communication area was found to be minimal in the migration of the plume based on vertical groundwater flow and concentrations of COPCs in the communication area. Both the RFI and the Communication Area Site Investigation

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Report have been reviewed and approved by the USEPA.

Another communication area of vertical interconnection exists between the Perched and USG Aquifers, and was observed near the southeastern property line of the former USAF Plant 36 (AFP 36) property (southern tip of the site). This communication area was first identified during the SAI (O'Brien & Gere, 2008), and was further investigated during the installation of additional monitoring wells at the site in 2008 and 2009. The findings of the available data indicate a vertical component of groundwater flow exists in this area, and that the vertical communication pathway in this communication area may contribute to the downward migration of the plume in this area.

FREE PRODUCT CONTAMINATION

Total Petroleum Hydrocarbon Products (LNAPL)

The RFI report identified the presence of Total Petroleum Hydrocarbon free products in the area of the Bulk Fuel Storage Tanks. The USAF has completed additional investigations of this area (see the Draft Site Investigation Report for the Fuel Farm Investigation at Former Air Force Plant 36). The findings of this report identify the absence of free product in this area and identify a discrete area of impact.

In addition, residual LNAPL was identified during the SAI activities in additional areas on the former AFP 36 property. However, the presence of residual LNAPL within the chlorinated solvent plumes at the site may be contributing to the degradation of the COPCs at the site; therefore, are considered beneficial to the overall plume stability at the site.

DNAPLs

Dense Non-Aqueous Phase Liquids (TCA, TCE) were used in former manufacturing processes on site and were identified in the RFI report. No free product DNAPL has been observed at the site, including during the SAI conducted in 2008.

Summary

A plume is stabilized, as defined by EPA, if it remains within the "existing area of contaminated ground water". A plume of contaminated groundwater could remain in its existing area if it is no longer expanding above levels of concern due to engineered controls, physical barriers, natural attenuation, geologic formation...etc. Based on the results of the data evaluation, the USG and LSG Aquifer plumes meet this definition and are stable (i.e., migration under control).

The Perched Aquifer plume does not appear to be expanding; however, the potential for discharging to surface water exists. Therefore, although the Perched Aquifer plume is stable, it may not be considered "under control" due to the surface water pathway. For the Perched Aquifer, the El determination would be based on whether or not the continued discharge of groundwater represented an unacceptable impact to the receiving surface water, which is discussed in Item 5.

Additional information and updated analysis for the groundwater to surface water pathway and the groundwater pathway is provided in the CMS Report (OBG, 2017), Appendix C – Groundwater CMOs. Key understandings include:

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- GE has a groundwater Interim Remedial Measure (IRM) (strategic pumping and natural attenuation) in place and operating, resulting in a stable plume, with groundwater pumping and Monitored Natural Attenuation (MNA) achieving the short-term cleanup goal of protectiveness.
- The pump and treat (P&T) program, operating since 2011, and MNA program have decreased chlorinated volatile organic compound (CVOC) concentrations in groundwater by as much as two orders of magnitude and continues to be protective of potential receptors at the Wyoming Well Field and Mill Creek.
- The history and nature of industrial activity in this area of the Mill Creek valley has resulted in multiple off-site potential sources that degraded ambient groundwater quality in the Mill Creek Basin.

Footnote:

² "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4.	Does "cor	"contaminated" groundwater discharge into surface water bodies?		
	<u> X</u>	If yes - continue after identifying potentially affected surface water bodies.		
		If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.		
		If unknown - skip to #8 and enter "IN" status code.		

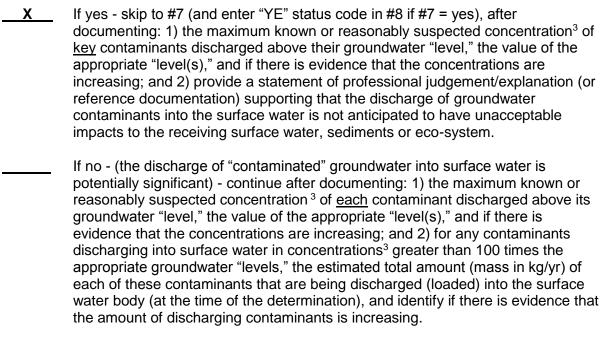
Rationale and Reference(s): At least a portion of the Perched Aquifer system discharges to the Mill Creek. The USG and LSG Aquifers do not discharge to surface water within reasonable proximity of the site. Direct sampling of the surface water was not completed as the site specific risk assessment concluded that the risk from impact to the surface water from contaminants that may be present in these aquifers was not significant (see Item 5).

Additional information and analysis of the groundwater to surface water (i.e., Perched aquifer discharge to the Mill Creek) is provided in the CMS Report (OBG, 2017) and associated Appendix C – Groundwater CMOs. Highlights of findings are provided in Item 5 below.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be "**insignificant**" (i.e., the maximum concentration³ of each contaminant discharging into surface water is less than 10 times the appropriate groundwater "level," and there are no other conditions (e.g., the nature or number of discharging contaminants, or environmental

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setting), which significantly increase the potential for unacceptable impacts to surface water, sediments or eco-systems at these concentrations)?



If unknown - enter "IN" status code in #8.

Rationale and Reference(s): The examination of the impact from the discharge of Perched Aquifer groundwater is presented in Appendix D of the HHRA. This portion of Appendix D has been approved by the USEPA and identifies the absence of unacceptable risks from the discharge of groundwater to surface waters (Section D.5.0). The concentrations of the COPCs were reviewed at perimeter groundwater monitoring wells. Observed concentrations were compared to the Ohio numerical water quality standards (See table D-28 from the HHRA). These concentrations were found to be below these standards with the exception of nickel. The nickel concentration is slightly above the Ohio numerical water quality criteria (less than 2 times). There is no source identified for nickel on site. Nickel is not very mobile in groundwater and this comparison does not take into account natural attenuation, or dilution.

Furthermore, the OEPA has statewide water quality criteria for the protection of aquatic life in an outside mixing zone average for rivers located in the Ohio River drainage basin. For the groundwater sampling conducted at the site, it appears the concentrations of COPCs are below this criteria.

These conclusions are further supported by the information and additional analysis of the shallow groundwater to surface water pathway provided in the CMS Report (OBG, 2017) and associated Appendix C – Groundwater CMOs. Discharge of impacted shallow groundwater (i.e., Perched zone) to surface water/sediment of the nearby Mill Creek was considered as a potential exposure pathway. The primary route of potential human exposure is incidental ingestion of surface water. Exposure via dermal contact, ambient inhalation, and fish consumption is considered de minimis. The Mill Creek is not designated as a public water supply and use as a recreational watershed is minimal. Ecological exposure routes include direct contact with Mill

Facility: <u>General Electric</u> CA750

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Creek surface water and sediment by benthic invertebrates and fish, and ingestion of surface water and incidental ingestion of sediment by wildlife receptors. The surface water pathway, including minimal recreational use and relatively poor water quality due to urban runoff and industrial/municipal discharge, was also considered in the development of groundwater CMOs at the Facility boundary.

The groundwater Interim Remedial Measure (IRM) of strategic pumping and natural attenuation has stabilized the groundwater plume(s) and has achieved protectiveness of human health and the environment under current conditions.

Footnote:

6.

³ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

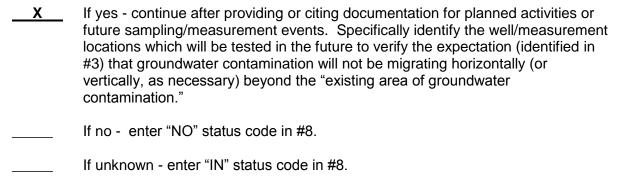
Can the discharge of "contaminated" groundwater into surface water be shown to be " currently acceptable " (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented ⁴)?			
	If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR 2) providing or referencing an interim-assessment, ⁵ appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist(s), including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.		
	If no - (the discharge of "contaminated" groundwater cannot be shown to be "currently acceptable") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments and/or eco-systems.		
	If unknown - skip to 8 and enter "IN" status code.		

Rationale and Reference(s): This item was skipped per direction of Item 5.

CA750 Page 9 of 9

Footnotes:

- ⁴ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.
- ⁵ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.
- 7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"



Rationale and Reference(s): USEPA and the permittee have determined that groundwater sampling and evaluation will be continued on a routine basis (currently semi-annually) in accordance with our most recent groundwater sampling plan and the IRM Performance Monitoring Plan (PMP), which were reviewed and approved by the USEPA, as modified in writing, and reapproved by the USEPA. The plans identify the well/measurement locations utilized to monitor the migration of each aquifer's plume, and to confirm the continued stability of the plumes at the site.

The development of groundwater CMOs and the groundwater monitoring approach to track progress was presented in the CMS Report (OBG, 2017) and particularly, Appendix C – Groundwater CMOs. As noted in the CMS Report, GE will prepare an update to the PMP that incorporates the approach and procedures to continue to monitor stability of the plumes at the site.

8. Check the appropriate RCRA Info status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

Facility: General CA750	ral Electric				
Page 10 of 9					
<u> </u>	YE - Yes, "Migration of Contaminated Groundwate verified. Based on a review of the information con it has been determined that the "Migration of Conta" Under Control" at the GE Aircraft Engines facility located at One Neumann Way, Cincinnati, Ohio determination indicates that the migration of "contaunder control, and that monitoring will be conducted groundwater remains within the "existing area of control that the original of the property of the propert	tained in this EI determination, aminated Groundwater" is 7, EPA ID # OHD 00 817 312, Specifically, this aminated" groundwater is 2d to confirm that contaminated contaminated groundwater."			
	NO - Unacceptable migration of contaminated groundwater is observed or expected.				
	IN - More information is needed to make a determ	ination.			
Rationale and Reference(s): The RFI and subsequent investigations and evaluations, and past sampling of groundwater monitoring wells has demonstrated the extent of contamination and the stability of the groundwater plume at the site (i.e., on and off site).					
Completed by	:(Signature) Date				
	(Print) (Title)	_			
Supervisor:	(Signature)	Date			
	(Print) (Title) (EPA Region or State)				
Locations whe	ere References may be found:				
Records Co	– 8 th Floor, Region 5 enter – 7 th Floor, Region 5 none and e-mail numbers				
(Name) (Phone #) (E-mail) ref: <i>ca750epa</i> .	(312) 886-0656 @epamail.epa.gov				

Attachment B

Updated EI Determination

Supporting Statistical and

Trend Analysis with

MAROS Summary

El Determination Evaluation Bullet Summary GE Evendale, Ohio

Executive Summary:

- The Perched, USG and LSG aquifer plumes overall appear to be stable or decreasing, especially once all of the new wells were installed in 2009 (see rest of this document and its attachments, including graphs), as evident by:
 - Mass of plumes appear stable or decreasing
 - Center of mass of plumes appear stable or decreasing
 - o Most individual wells are stable or decreasing, exceptions or noteworthy conditions:
 - Perched Aquifer: source area wells AF-24P have increasing trends for the TCA Group and TCE Group related to TCA, and TCE and cis-1,2-DCE concentrations, respectively associated with plume movement within the Perched capture zone area; downgradient well H-221 has a decreasing overall trend, especially noticeable since 2012, as does the nearest upgradient well (OSMW-10P), which also has decreasing trends
 - USG Aquifer: OSMW-8S has an increasing trend for the TCA Group related to 1,1-DCA concentrations; however, the nearest upgradient well (OSMW-6S) has decreasing trends as do other upgradient wells in this area of the site; furthermore, OSMW-8S has been decreasing since the fourth quarter 2014, and should continue to decrease. OSMW-5S has increasing trends for both the TCA and TCE Groups related to 1,1-DCE, cis-1,2-DCE and VC; however, the impacts in this well are believed to be attributed to another source
 - LSG Aquifer: the TCE Group in OSMW-8D has an increasing trend for the TCE Group related primarily to VC, although cis-1,2-DCE recently, but the June 2017 results were significantly less than the December results. Samples will continue to be collected from OSMW-8D to verify the trend for this well and because the nearest upgradient well (OSMW-6D) is stable or decreasing this well should stabilize. TMW-2D has an increasing trend for the TCE Group related to cis-1,2-DCE and TCE, and will continue to be monitored.
 - XX (east to west) Spread increases in the Perched and LSG aquifer plumes reflect the
 installation of the additional off-site monitoring wells in 2009, while the USG aquifer appears
 to be stable or decreasing in spite of adding additional wells. The spread appears stable or
 decreasing in both the Perched and LSG since 2009.
 - YY (north to south) Spread appears stable or decreasing, but may reflect the installation of the additional off-site monitoring wells.

Data Consolidation:

- Ethane mass concentrations (in mol/L) represents the total mass of 1,1,1-TCA (TCA) and its daughter products (1,1-DCA, 1,1-DCE and chloroethane) (i.e., TCA Group)
- Ethene mass concentrations (in mol/L) represents the total mass of TCE and its daughter products (cis- and trans-1,2-DCE and vinyl chloride) and PCE (*i.e.*, TCE Group)
- The ethane (TCA Group) and ethane (TCE Group) data was consolidated into quarterly data by taking the geometric mean of the data if multiple samples were collected in a quarter
- Data from 2005 through 2017 (i.e., last 12 years) was utilized in the analysis

Evaluation Methods:

- Statistical Trend Analysis (on individual well data):
 - Mann-Kendall
 - o Linear Regression
- Plume Analysis:
 - Dissolved Mass Estimation (is dissolved mass increasing, stable or decreasing)
 - Center of Mass Estimation (is center of mass moving away from source, remaining similar or moving toward source area)
 - o Figure 1 illustrates a hypothetical plume with a decreasing mass and center of mass
- Evaluation Tools:
 - o Excel spreadsheets and graphs
 - o Monitoring and Remediation Optimization Software (MAROS, AFCEE 2006)

Challenges:

- Addition of new wells can skew data (*i.e.*, the addition of new wells can potentially change the mass, and/or center of mass of the plume depending on their location and concentrations.)
- Changes in sampling schedules (*i.e.*, which wells are sampled, when and how often) can increase data evaluation complexity
- Implementation of vertical aquifer sampling (VAS) and proper screening of LSG aquifer wells
 increases complexity of analysis for this aquifer (only wells installed after 2005 were installed using
 VAS)
- Complexities in data make it difficult to apply one time frame to data analysis for all wells and all aquifers
- Changes in chemical state (*i.e.*, chemical degradation) adds complexity to the analysis (*i.e.*, degradation of parent products may lead to increase in daughter products, but the mass of total constituents of potential concern [COPCs] may be decreasing overall. Therefore, this evaluation utilizes the total ethanes and total ethenes data. Furthermore, because of the change in molecular weight of the COPCs as they degrade, the moles of COPCs per liter of water were utilized in this analysis instead of the concentration of COPCs [thus the very small mass values in the attached graphs]. However, MAROS does not allow for moles per liter, so the mg/L in the output files are actually moles/L. Similarly, mass in Kg is actually moles in the MAROS files)

Findings (Has Migration of Contaminated Groundwater Stabilized?):

• Perched Aquifer:

- Plume overall appears to be stable or decreasing, especially since 2009 (see attachments, including MAROS outputs and graphs and plots)
 - Mass of plume appears stable or decreasing
 - Center of mass appears stable or decreasing (one challenge has been when only a few wells or when more downgradient or off-site wells have been sampled, especially during the second quarter 2011 sampling event that resulted in a center of mass near OSMW-1P)
 - Most individual wells stable or decreasing.
 - XX (east to west) Spread increase reflects the installation of the additional off-site monitoring wells in 2009. Spread stable since 2009.

YY (north to south) Spread appears stable or decreasing, especially since 2007.

USG Aquifer:

- Plume overall appears to be stable, especially since 2009 once all of the new wells were installed (see attachments, including MAROS outputs and graphs and plots)
 - Mass of plume appears stable to decreasing
 - Center of mass appears stable or decreasing
 - Most individual wells stable or decreasing (OSMW-8S has an increasing trend for the TCA Group related to 1,1-DCA concentrations; however, the nearest upgradient well (OSMW-6S) has decreasing trends as do other upgradient wells in this area of the site; furthermore, OSMW-8S has been decreasing since the fourth quarter 2014, and should continue to decrease. OSMW-5S has increasing trends for both the TCA and TCE Groups related to 1,1-DCE, cis-1,2-DCE and VC; however, the impacts in this well are believed to be attributed to another source)
 - XX (east to west) Spread appears stable or decreasing, especially since 2006 in spite of adding additional wells in 2009
 - YY (north to south) Spread appears stable or decreasing.

LSG Aquifer:

- Plume overall appears to be stable or decreasing, especially since 2006 (see attachments, including MAROS outputs and graphs and plots)
 - Mass of plume appears stable or decreasing
 - Center of mass appears stable or decreasing
 - Most individual wells stable or decreasing (however, MAROS indicates that OSMW-8D has an increasing trend for the TCE Group related primarily to VC, although cis-1,2-DCE recently, but the June 2017 results were significantly less than the December results. Samples will continue to be collected from OSMW-8D to verify the trend for this well and because the nearest upgradient well (OSMW-6D) is stable or decreasing this well should stabilize. TMW-2D has an increasing trend for the TCE Group related to cis-1,2-DCE and TCE, and will continue to be monitored.
 - XX (east to west) Spread increase reflects the installation of the additional off-site monitoring wells in 2009. Spread stable since 2009.
 - YY (north to south) Spread appears somewhat stable, but may reflect the installation of the additional off-site monitoring wells.

FIGURE 1

LEGEND

- SOURCE AREA
- X CENTER OF MASS OF PLUME
- X NEW CENTER OF MASS OF PLUME
- d DISTANCE BETWEEN X AND SOURCE AREA

HYPOTHETICAL CENTER OF MASS PLOTS

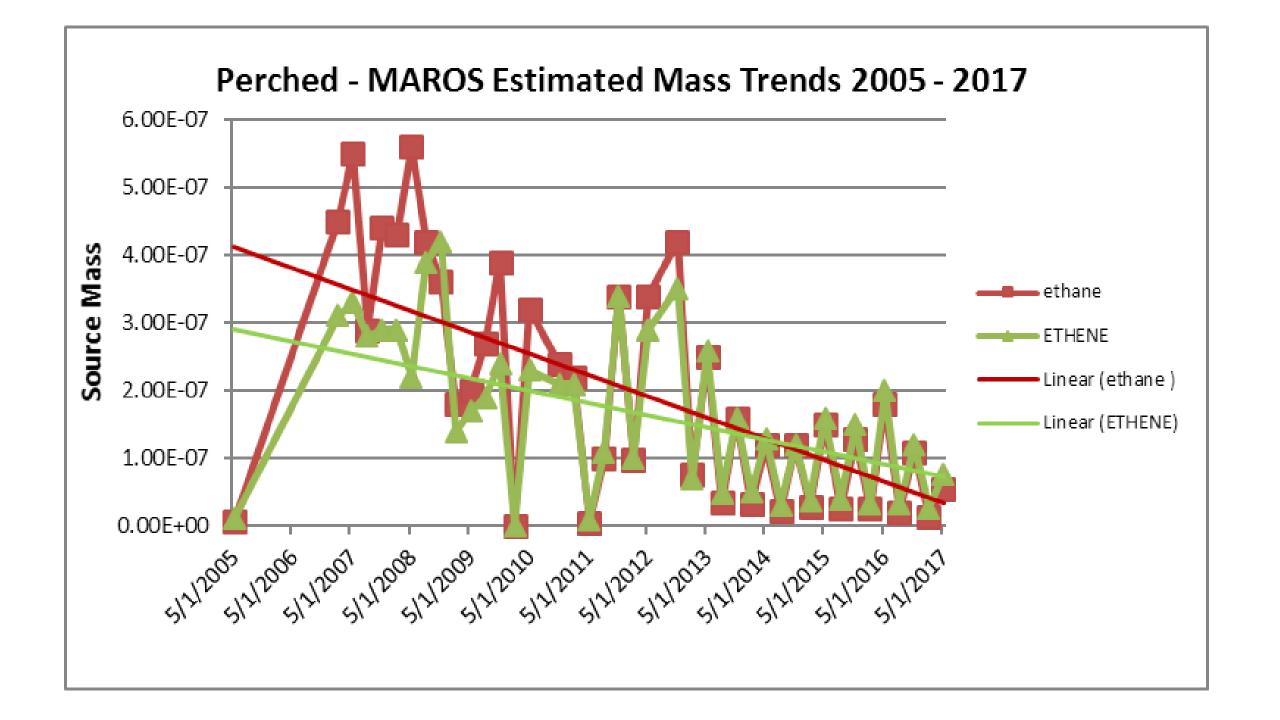
March 2011

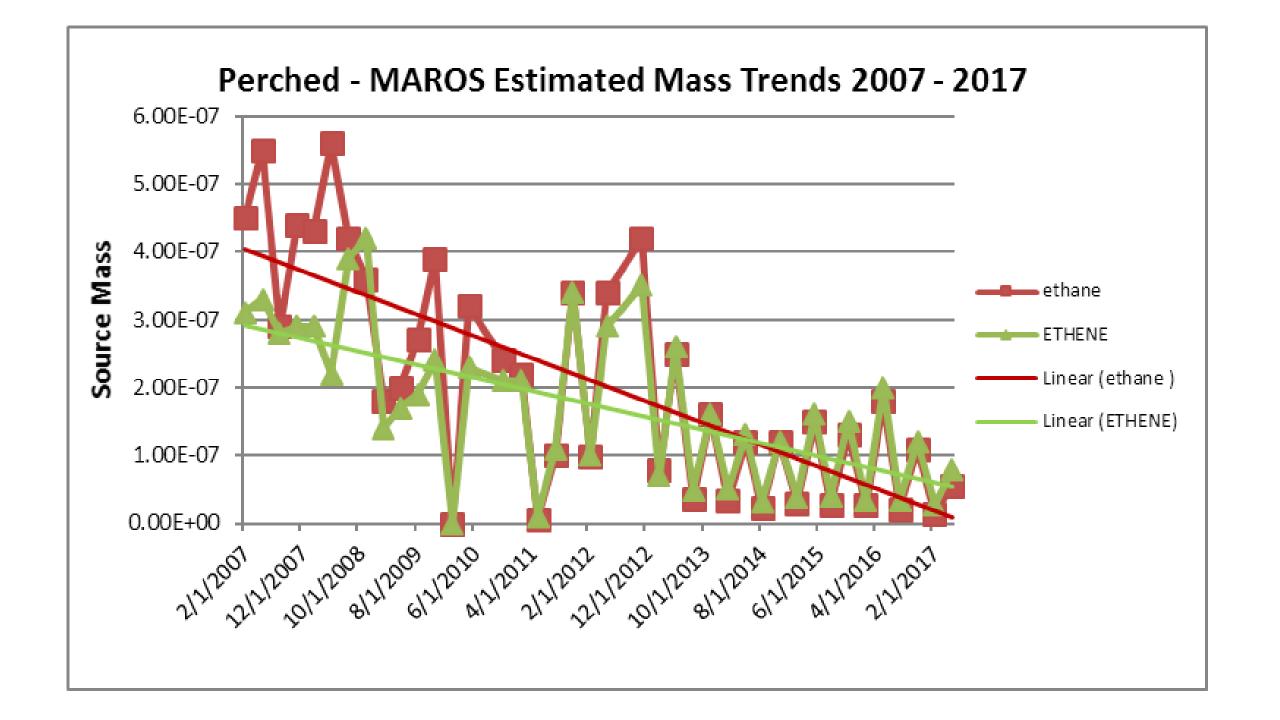


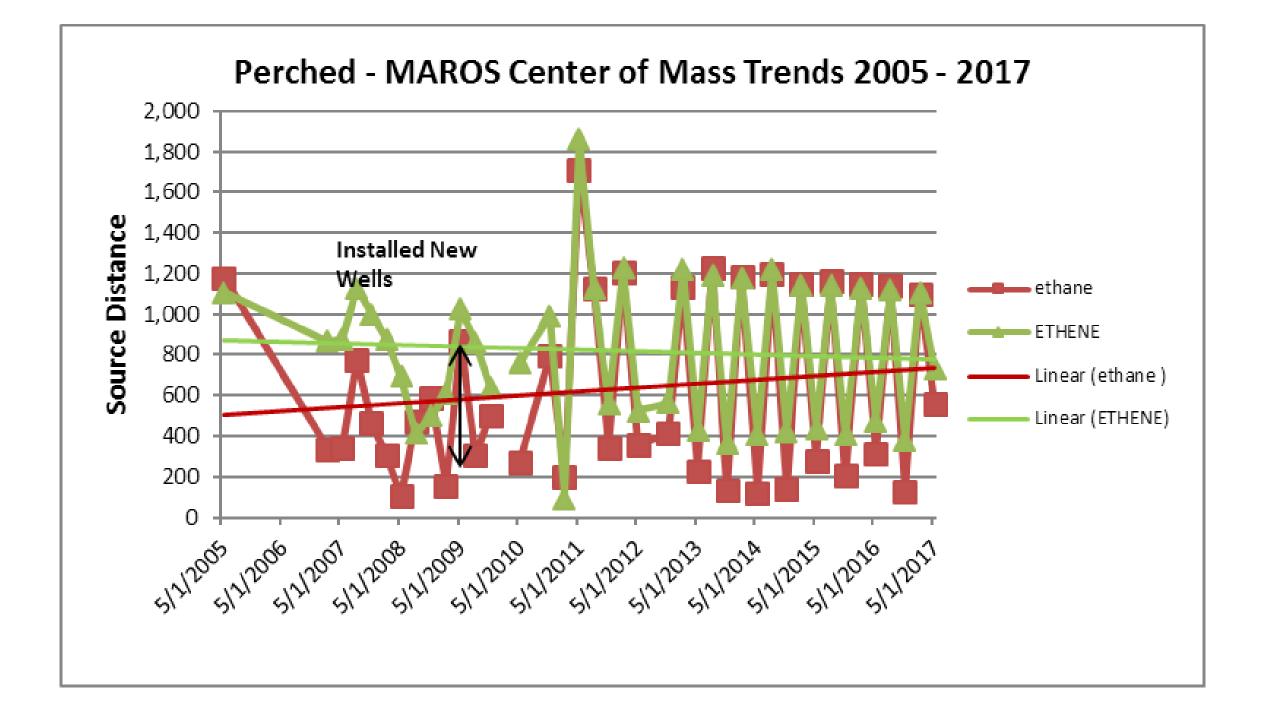
03-28-2011 078 T.IK

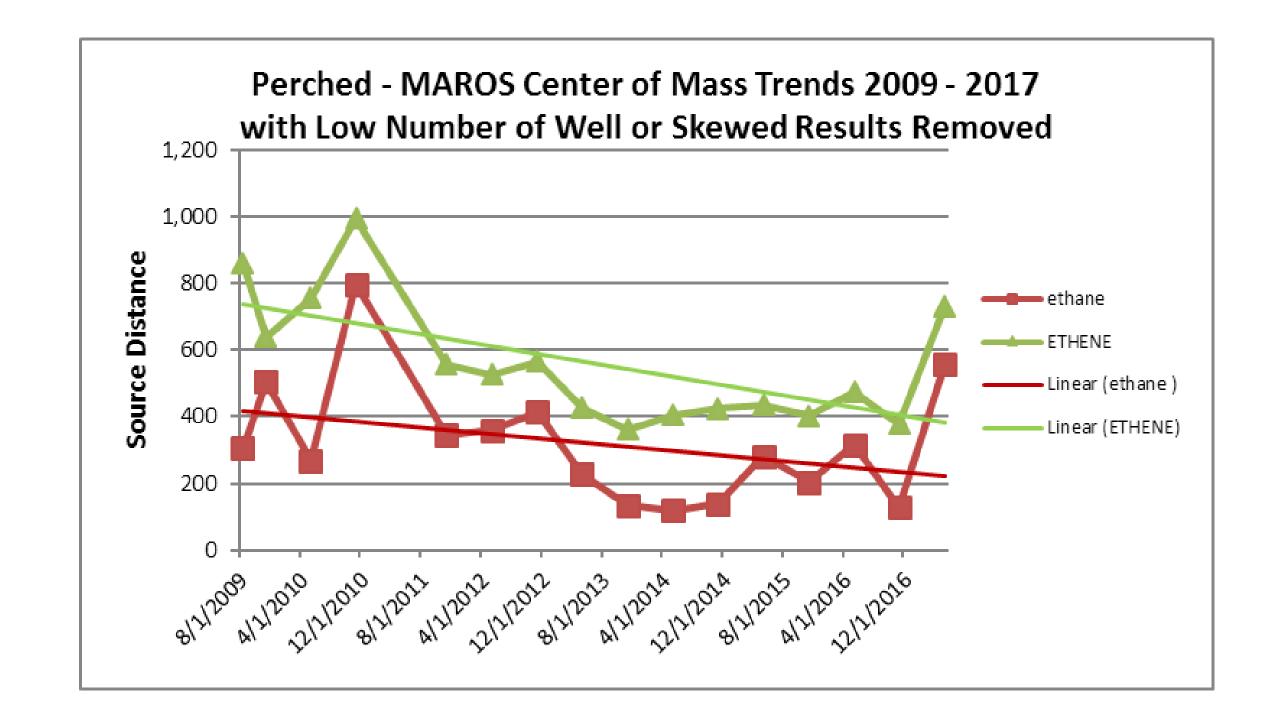
PERCHED AQUIFER SUPPORTING INFORMATION

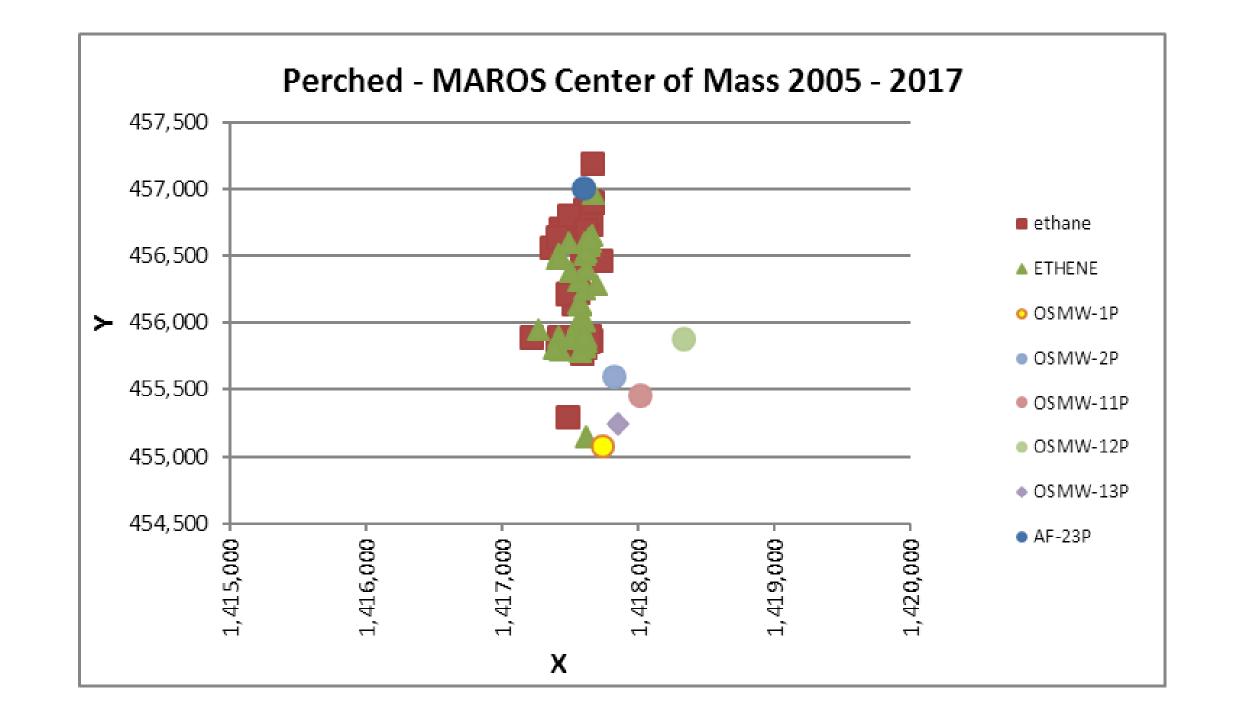
- A) Plume Mass Estimate Charts
- B) Center of Mass Charts and Plot
 - C) Spread of Plume Charts

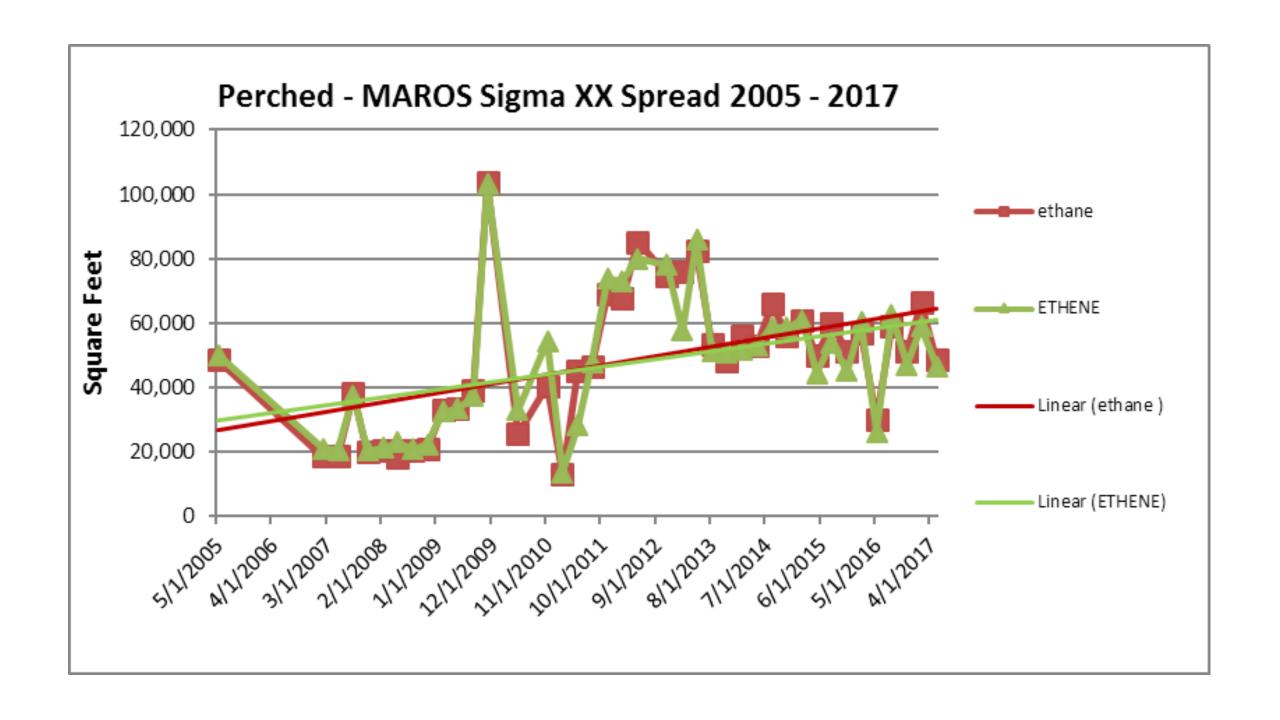


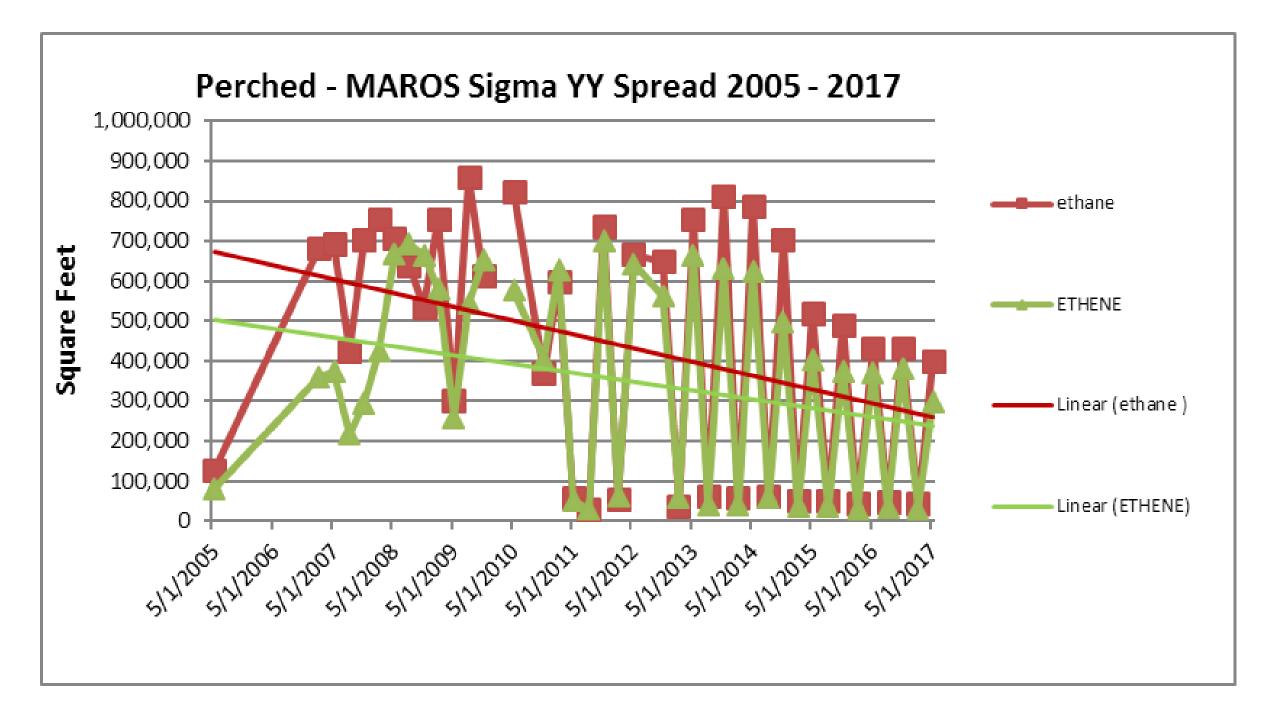


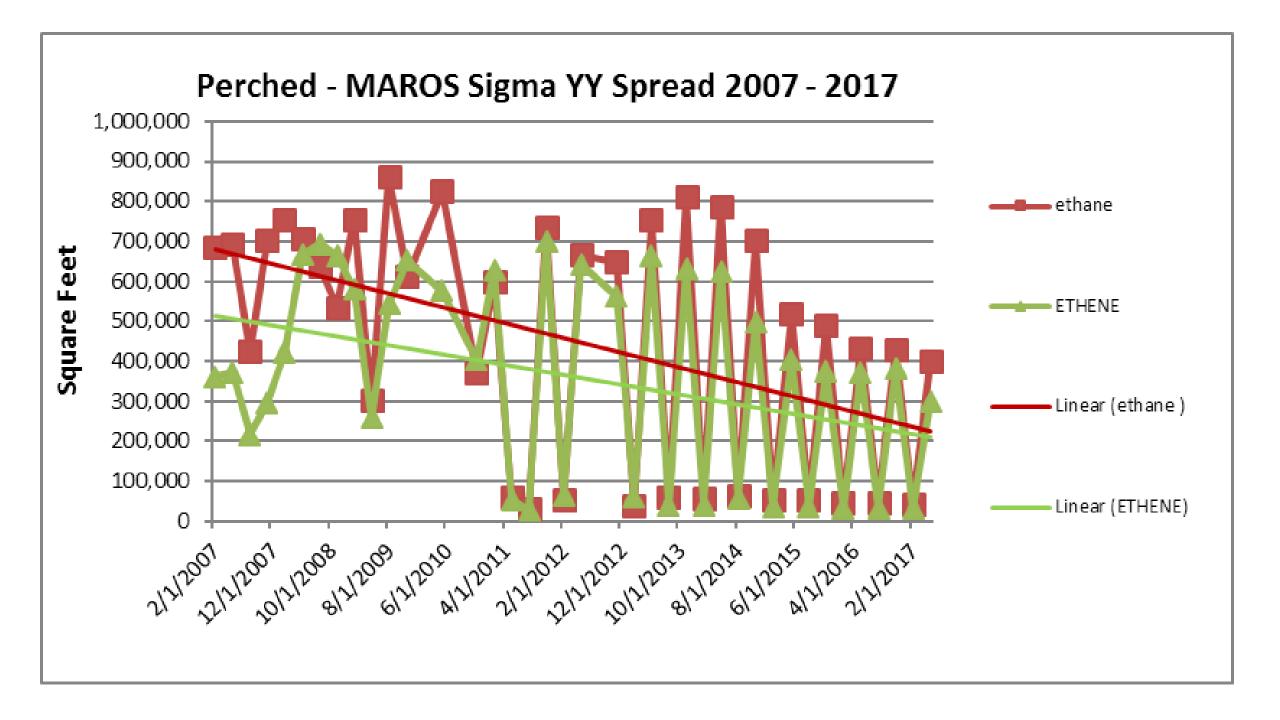












MAROS OUTPUT FILES – Perched Aquifer

- A) MAROS Statistical Trend Analysis Summary
- **B) MAROS Spatial Moment Analysis Summary**
 - C) MAROS Site Results

Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

Time Period: 8/1/2009 to 7/7/2017

Consolidation Period: Quarterly

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values : Actual Value

	C /						Mann-	Linear
	Source /		of	Average	Median Conc.		Kendall	Regression
Well	Tail	Samples	Detects	Conc. (mg/L)	(mg/L)	"ND" ?	Trend	Trend
ETHANE								
AF-12P	Т	1	0	8.1E-11	8.1E-11	Yes	ND	ND
AF-13P	Т	22	0	2.0E-11	1.4E-13	Yes	ND	ND
AF-1P	S	1	1	7.9E-11	7.9E-11	No	N/A	N/A
AF-23P	S	12	12	3.9E-09	3.8E-09	No	D	D
AF-24P	S	17	17	3.6E-09	3.5E-09	No	PI	1
AF-25P	S	28	28	3.4E-09	3.6E-09	No	S	S
AF-2P	S	16	16	8.7E-11	9.3E-11	No	1	1
AF-3P	S	17	17	2.9E-10	2.9E-10	No	D	D
AF-4P	S	23	23	4.6E-10	4.4E-10	No	D	D
AF-5P	S	23	23	6.0E-10	5.0E-10	No	D	D
AF-7P	S	28	26	1.4E-09	1.2E-10	No	D	D
AOC LDMW-1S	S	16	16	3.5E-09	3.5E-09	No	PD	S
AOC PSTMW-1SR	S	13	0	2.7E-11	1.4E-13	Yes	ND	ND
AOC PSTMW-2S	S	16	16	1.6E-10	1.4E-10	No	D	D
H-221	Т	16	16	3.3E-10	3.1E-10	No	D	D
OSMW-10P	Т	25	25	1.2E-09	8.6E-10	No	D	D
OSMW-11P	Т	24	23	1.4E-11	1.5E-11	No	D	PD
OSMW-12P	Т	26	26	4.8E-11	4.8E-11	No	D	D
OSMW-13P	Т	25	25	3.3E-11	3.1E-11	No	D	D
OSMW-1P	Т	26	26	2.4E-11	2.5E-11	No	S	1
OSMW-2P	Т	17	17	1.7E-10	6.8E-11	No	D	D
PMW-3P	Т	28	28	1.1E-09	1.1E-09	No	D	D
TMW-1P	S	23	23	1.8E-09	1.6E-09	No	D	S
TMW-2P	Т	4	2	5.8E-11	6.2E-11	No	NT	NT
ETHENE								
AF-12P	Т	1	0	7.2E-11	7.2E-11	Yes	ND	ND

MAROS Version 3.0

Release 352, September 2012

Tuesday, August 22, 2017 Page 1 of 2

Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

Well Name	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHENE								
AF-13P	Т	22	0	1.9E-11	1.4E-13	Yes	ND	ND
AF-1P	S	1	1	1.1E-10	1.1E-10	No	N/A	N/A
AF-23P	S	12	12	2.1E-09	2.5E-09	No	NT	1
AF-24P	S	17	17	4.5E-09	4.4E-09	No	1	1
AF-25P	S	28	28	2.6E-09	2.6E-09	No	NT	NT
AF-2P	S	17	17	2.9E-10	2.9E-10	No	D	S
AF-3P	S	17	17	6.8E-10	7.4E-10	No	D	D
AF-4P	S	23	23	8.6E-10	8.4E-10	No	D	D
AF-5P	S	22	22	1.6E-09	1.3E-09	No	D	D
AF-7P	S	28	28	1.4E-09	3.6E-10	No	D	D
AOC LDMW-1S	S	15	15	2.2E-09	2.4E-09	No	PD	D
AOC PSTMW-1SR	S	13	0	2.4E-11	1.4E-13	Yes	ND	ND
AOC PSTMW-2S	S	17	17	6.4E-11	2.2E-11	No	D	D
H-221	Т	16	16	5.0E-10	4.9E-10	No	D	D
OSMW-10P	Т	25	25	1.2E-09	1.1E-09	No	D	D
OSMW-11P	Т	26	21	2.3E-11	1.5E-11	No	D	D
OSMW-12P	Т	25	25	3.0E-11	3.0E-11	No	D	D
OSMW-13P	Т	26	21	1.8E-11	1.1E-11	No	D	D
OSMW-1P	Т	25	3	2.2E-11	1.4E-13	No	D	D
OSMW-2P	Т	17	17	4.3E-10	4.9E-10	No	NT	1
PMW-3P	Т	29	29	2.6E-09	2.8E-09	No	D	D
TMW-1P	S	22	22	2.4E-09	1.9E-09	No	D	S
TMW-2P	Т	3	2	4.2E-11	4.6E-11	No	N/A	N/A

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (ND)

The Number of Samples and Number of Detects shown above are post-consolidation values.

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	0th Moment	1st Mom	ent (Center	of Mass)	2nd Moment (Spread)		
	Estimated			Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHANE							
8/15/2007	2.9E-07	1,417,555	456,234	777	38,197	425,161	12
11/15/2007	4.4E-07	1,417,588	456,546	464	19,960	705,048	12
2/15/2008	4.3E-07	1,417,596	456,700	310	20,303	754,789	12
5/15/2008	5.6E-07	1,417,637	456,916	103	18,222	706,305	10
8/15/2008	4.2E-07	1,417,589	456,541	469	20,375	639,917	12
11/15/2008	3.6E-07	1,417,588	456,424	586	20,847	534,303	11
2/15/2009	1.8E-07	1,417,611	456,852	159	33,212	755,087	12
5/15/2009	2.0E-07	1,417,518	456,148	866	33,610	303,166	12
8/15/2009	2.7E-07	1,417,581	456,704	306	39,181	861,419	15
11/15/2009	3.9E-07	1,417,359	456,564	504	103,650	612,338	20
2/15/2010	0.0E+00						5
5/15/2010	3.2E-07	1,417,612	456,743	268	25,520	824,826	17
11/15/2010	2.4E-07	1,417,481	456,221	797	40,464	370,088	17
2/15/2011	2.2E-07	1,417,663	457,200	202	13,007	599,573	10
5/15/2011	5.8E-09	1,417,481	455,299	1,714	45,282	59,121	7
8/15/2011	1.0E-07	1,417,417	455,894	1,130	46,634	30,523	6
11/15/2011	3.4E-07	1,417,426	456,710	345	69,026	736,647	17
2/15/2012	9.8E-08	1,417,406	455,821	1,204	67,602	54,338	12
5/15/2012	3.4E-07	1,417,433	456,689	360	85,169	666,613	20
11/15/2012	4.2E-07	1,417,403	456,644	413	74,874	648,492	20
2/15/2013	7.8E-08	1,417,512	455,876	1,137	76,080	38,480	8
5/15/2013	2.5E-07	1,417,492	456,807	228	82,376	753,457	21
8/15/2013	3.5E-08	1,417,583	455,779	1,231	53,255	62,116	12
11/15/2013	1.6E-07	1,417,647	456,886	135	48,257	811,812	21
2/15/2014	3.3E-08	1,417,605	455,824	1,186	56,025	57,666	12
5/15/2014	1.2E-07	1,417,655	456,906	120	52,919	787,111	21
8/15/2014	2.2E-08	1,417,580	455,809	1,201	65,894	62,761	10
11/15/2014	1.2E-07	1,417,638	456,879	138	56,119	702,987	20
2/15/2015	3.0E-08	1,417,610	455,863	1,147	60,826	52,036	11
5/15/2015	1.5E-07	1,417,653	456,736	281	49,845	518,416	20
8/15/2015	2.8E-08	1,417,608	455,848	1,162	59,922	51,852	12
11/15/2015	1.3E-07	1,417,654	456,816	203	51,095	490,590	20
2/15/2016	2.7E-08	1,417,628	455,865	1,146	56,930	45,263	12

MAROS Version 3.0

Sunday, August 20, 2017

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	0th Moment	1st Mom	ent (Center	of Mass)	2nd Mom	ent (Spread)	
Effective Date	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
ETHANE							
5/15/2010	6 1.8E-07	1,417,623	456,695	316	30,002	433,474	19
8/15/201	6 2.1E-08	1,417,646	455,871	1,141	59,210	46,758	12
11/15/2010	6 1.1E-07	1,417,659	456,899	129	51,295	430,509	20
2/15/201	7 1.5E-08	1,417,636	455,909	1,102	66,338	43,165	12
5/15/201	7 5.6E-08	1,417,728	456,467	559	48,567	399,737	18
ETHENE							
8/15/200	7 2.8E-07	1,417,516	455,885	1,128	37,580	217,344	12
11/15/200	7 2.9E-07	1,417,566	456,009	1,001	20,467	295,404	12
2/15/2008	8 2.9E-07	1,417,570	456,132	878	21,329	423,267	12
5/15/2008	3 2.2E-07	1,417,568	456,316	694	22,947	666,440	10
8/15/2008	3.9E-07	1,417,603	456,597	413	20,728	692,862	12
11/15/2008	8 4.2E-07	1,417,608	456,513	498	22,330	665,265	12
2/15/2009	9 1.4E-07	1,417,617	456,401	609	32,563	580,192	12
5/15/2009	9 1.7E-07	1,417,551	455,985	1,026	33,477	258,982	12
8/15/2009	9 1.9E-07	1,417,567	456,147	863	37,191	542,843	15
11/15/2009	9 2.4E-07	1,417,501	456,377	640	103,153	652,688	20
2/15/2010	0.0E+00						5
5/15/2010	0 2.3E-07	1,417,605	456,253	757	33,015	576,600	17
11/15/2010	0 2.1E-07	1,417,604	456,016	994	54,486	403,327	17
2/15/201	1 2.1E-07	1,417,673	456,963	91	13,581	628,093	10
5/15/201	1 1.0E-08	1,417,619	455,149	1,861	28,124	52,901	7
8/15/201	1 1.1E-07	1,417,416	455,894	1,130	47,852	29,315	6
11/15/2013	1 3.4E-07	1,417,435	456,477	556	73,681	700,843	17
2/15/2012	2 1.0E-07	1,417,430	455,794	1,227	73,132	62,919	12
5/15/2012	2 2.9E-07	1,417,416	456,515	526	79,929	643,277	20
11/15/2017	2 3.5E-07	1,417,404	456,478	565	78,137	561,338	20
2/15/2013	3 7.0E-08	1,417,381	455,805	1,224	57,559	59,156	8
5/15/2013	3 2.6E-07	1,417,488	456,597	427	85,897	663,879	21
8/15/2013	3 4.9E-08	1,417,608	455,817	1,193	51,292	40,408	12
11/15/2013	3 1.6E-07	1,417,655	456,653	362	50,810	631,271	21
2/15/2014	4 5.0E-08	1,417,610	455,834	1,176	51,660	39,980	12
5/15/2014	4 1.3E-07	1,417,654	456,609	406	53,110	623,906	21

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Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	Oth Moment	1st Mom	ent (Center	of Mass)	2nd Mom	ent (Spread)	
	Estimated			Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHENE							
8/15/2014	3.2E-08	1,417,570	455,791	1,219	58,734	57,513	10
11/15/2014	1.2E-07	1,417,635	456,588	424	58,479	499,189	20
2/15/2015	3.8E-08	1,417,611	455,867	1,143	60,940	36,714	11
5/15/2015	1.6E-07	1,417,641	456,577	436	44,446	403,824	20
8/15/2015	4.1E-08	1,417,619	455,866	1,144	53,903	35,822	12
11/15/2015	1.5E-07	1,417,639	456,608	404	45,081	375,628	20
2/15/2016	3.4E-08	1,417,612	455,885	1,125	60,360	31,256	12
5/15/2016	2.0E-07	1,417,618	456,537	474	26,177	371,368	19
8/15/2016	3.3E-08	1,417,621	455,891	1,119	62,472	31,976	12
11/15/2016	1.2E-07	1,417,640	456,633	380	47,061	381,535	20
2/15/2017	2.8E-08	1,417,600	455,903	1,107	58,965	30,854	12
5/15/2017	7.8E-08	1,417,689	456,284	732	46,601	297,084	18

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	ETHANE	0.81	-343	100.0%	D
0th Moment	ETHENE	0.69	-283	100.0%	D
First Moment	ETHANE	0.71	40	69.4%	NT
First Moment	ETHENE	0.46	-44	71.2%	S
Second Moment X	ETHANE	0.42	232	99.9%	I
Second Moment X	ETHENE	0.42	200	99.6%	I
Second Moment Y	ETHANE	0.69	-202	99.6%	D
Second Moment Y	ETHENE	0.71	-224	99.8%	D

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.30 Saturated Thickness: Uniform: 14 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Site Summary

Project: GE Evendale User Name: CSY

Location: Evendale State: Ohio

User Defined Site and Data Assumptions

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 1643 ft/yr
Current Plume Length: 3000 ft
Current Plume Width: 1000 ft
Number of Tail Wells: 11
Number of Source Wells: 20

Downgradient Information:

Distance from Edge of Tail to Nearest:

Downgradient receptor: 100 ft Downgradient property: 1400 ft

Distance from Source to Nearest:

Downgradient receptor: 3100 ft Downgradient property: 1600 ft

Contaminants of Concern (COC's)

ETHANE ETHENE

Well Summary

	Source / Tail /	urce / Tail / Sample Date Range						
Well Name	Delineation	Record Count	Minimum	Maximum Priority Constituent				
AF-1P	S	18	2/22/2000	12/21/2009 ETHANE				
AOC LDMW-1S	S	72	2/22/2000	############ETHANE				
AOC PSTMW-1S	S	16	2/22/2000	12/10/2001 ETHANE				
AOC PSTMW-1SR	S	26	3/30/2011	#############ETHANE				
OSMW-1P	Т	74	1/22/2007	#############ETHENE				
TMW-1P	S	60	7/25/2011	!#############ETHENE				
AF-2P	S	72	2/22/2000	#############ETHENE				
AOC LDMW-2S	S	16	2/22/2000	12/10/2001 ETHANE				
AOC PSTMW-2S	S	70	2/22/2000	#############ETHENE				
OSMW-2P	Т	56	1/22/2007	#############ETHENE				
TMW-2P	Т	26	8/1/2007	4/1/2011 ETHANE				
AF-3P	S	56	1/22/2007	!#############ETHENE				
AOC LDMW-3S	S	16	2/22/2000	12/10/2001 ETHANE				
AOC PSTMW-3S	S	16	2/22/2000	12/10/2001 ETHANE				
PMW-3P	Т	82	7/1/2009	!#############ETHENE				
AF-4P	S	76	2/22/2000	#############ETHENE				

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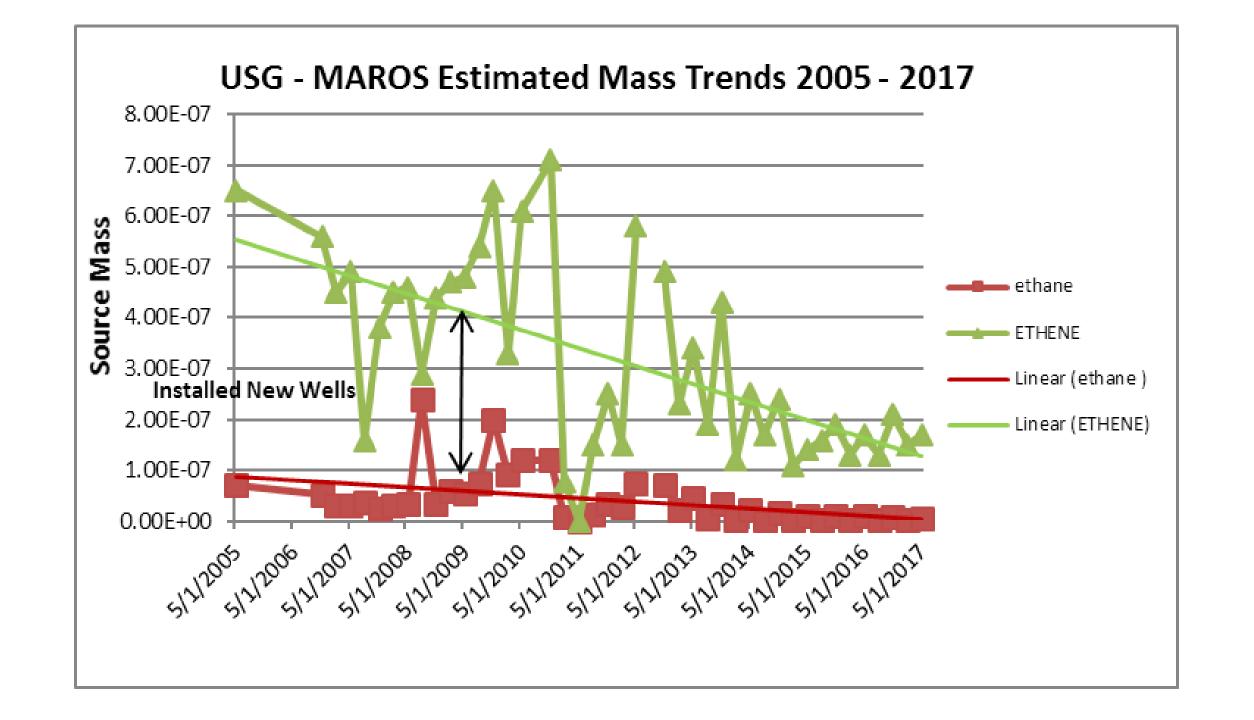
Release 352, September 2012

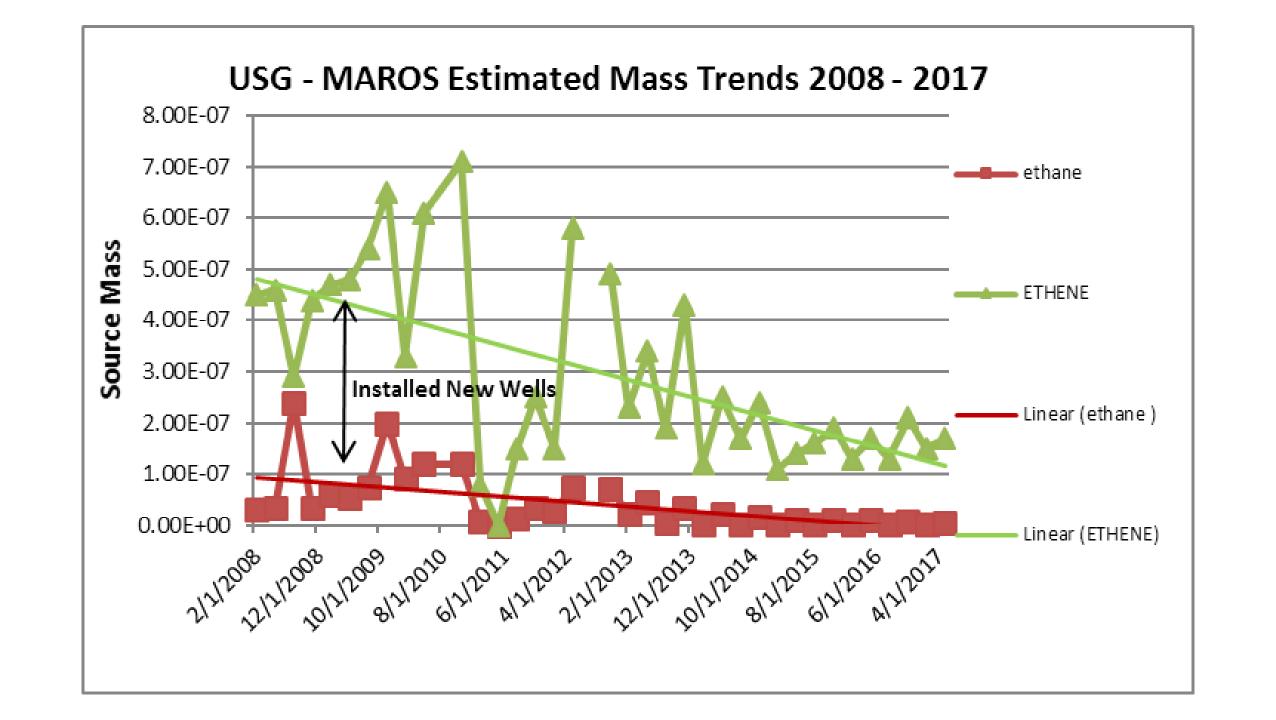
Sunday, August 20, 2017

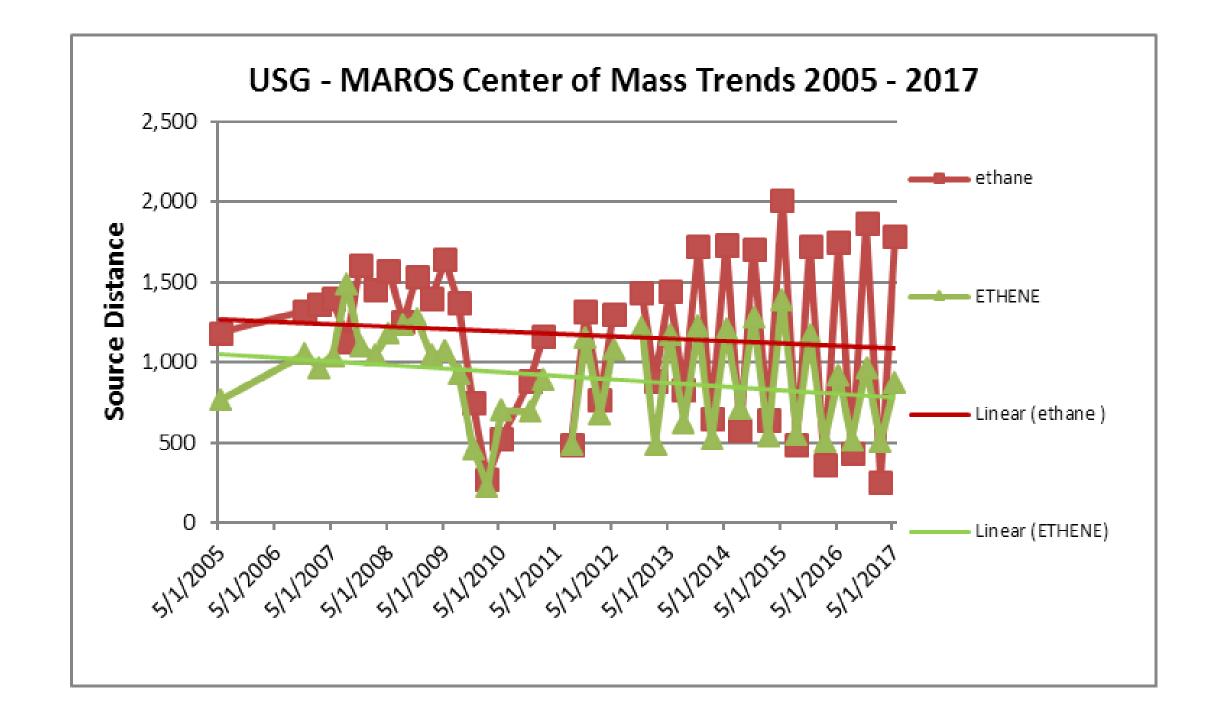
MAROS S	ite Sum	mary		
GE Evendale				User Name: CSY
Evendale				State: Ohio
AF-5P	S	84	2/22/2000	!############ETHENE
AF-7P	S	110	2/22/2000	#############ETHENE
OSMW-10P	T	60	7/1/2009	!############ETHENE
OSMW-11P	T	58	10/5/2009	#############ETHENE
AF-12P	T	16	7/11/2000	12/21/2009 ETHANE
OSMW-12P	T	58	10/5/2009	#############ETHENE
AF-13P	S	54	8/8/2011	#############ETHANE
OSMW-13P	T	58	10/5/2009	#############ETHENE
AF-16P	S	16	2/22/2000	12/10/2001 ETHENE
AF-18P	S	14	7/11/2000	12/10/2001 ETHANE
AF-23P	S	48	1/22/2007	!############ETHANE
AF-24P	S	56	1/22/2007	!############:ETHANE
AF-25P	S	94	1/22/2007	#############ETHENE
H-221	Т	56	1/22/2007	!############ETHANE
86-MW-4S	Т	14	7/11/2000	12/10/2001 ETHANE

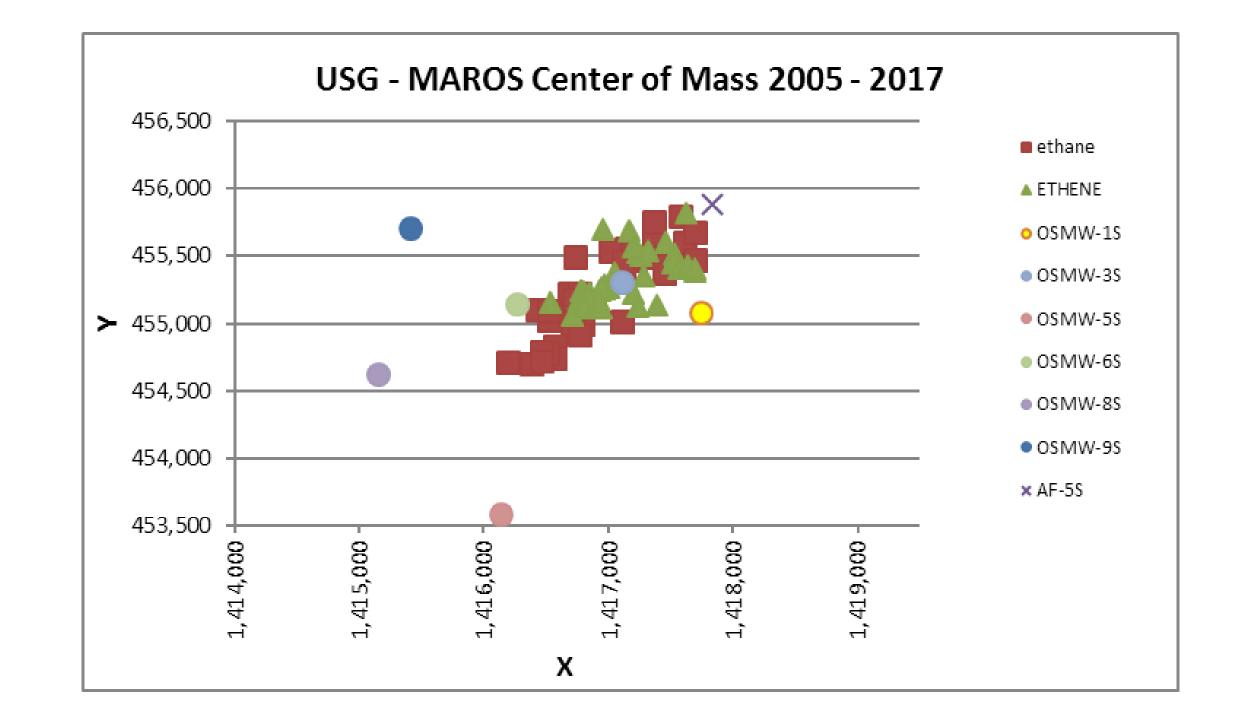
USG AQUIFER SUPPORTING INFORMATION

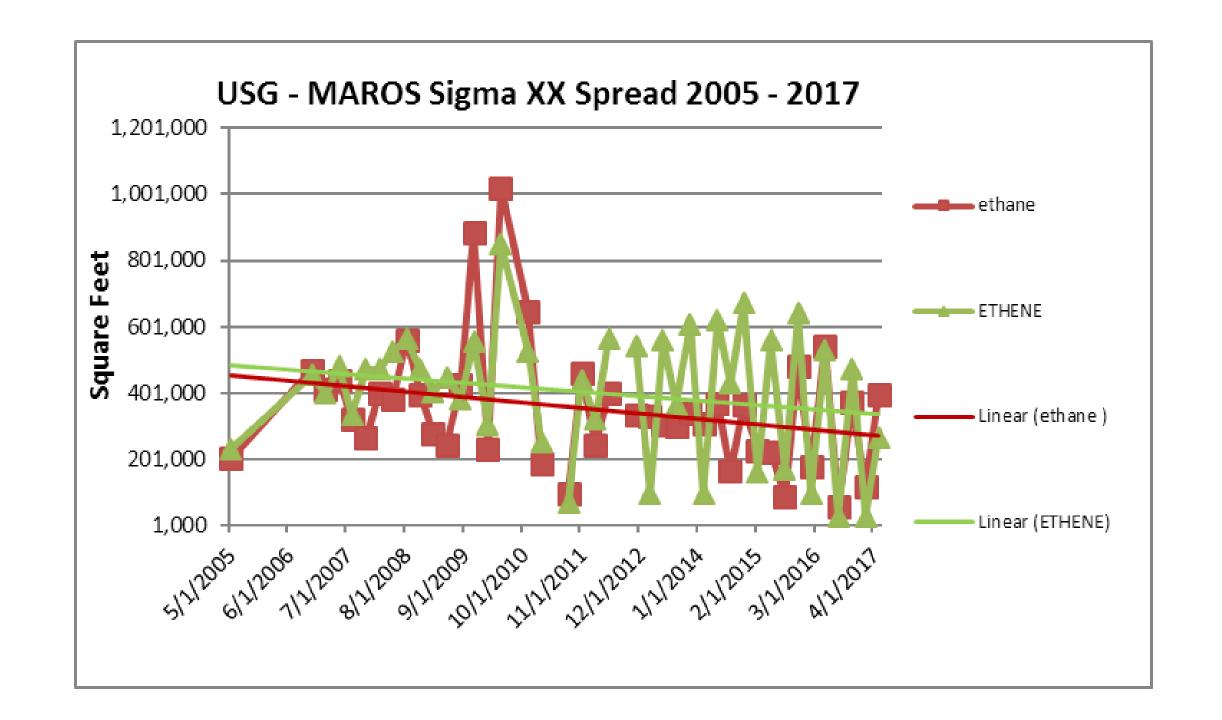
- A) Plume Mass Estimate Charts
- B) Center of Mass Charts and Plot
 - C) Spread of Plume Charts

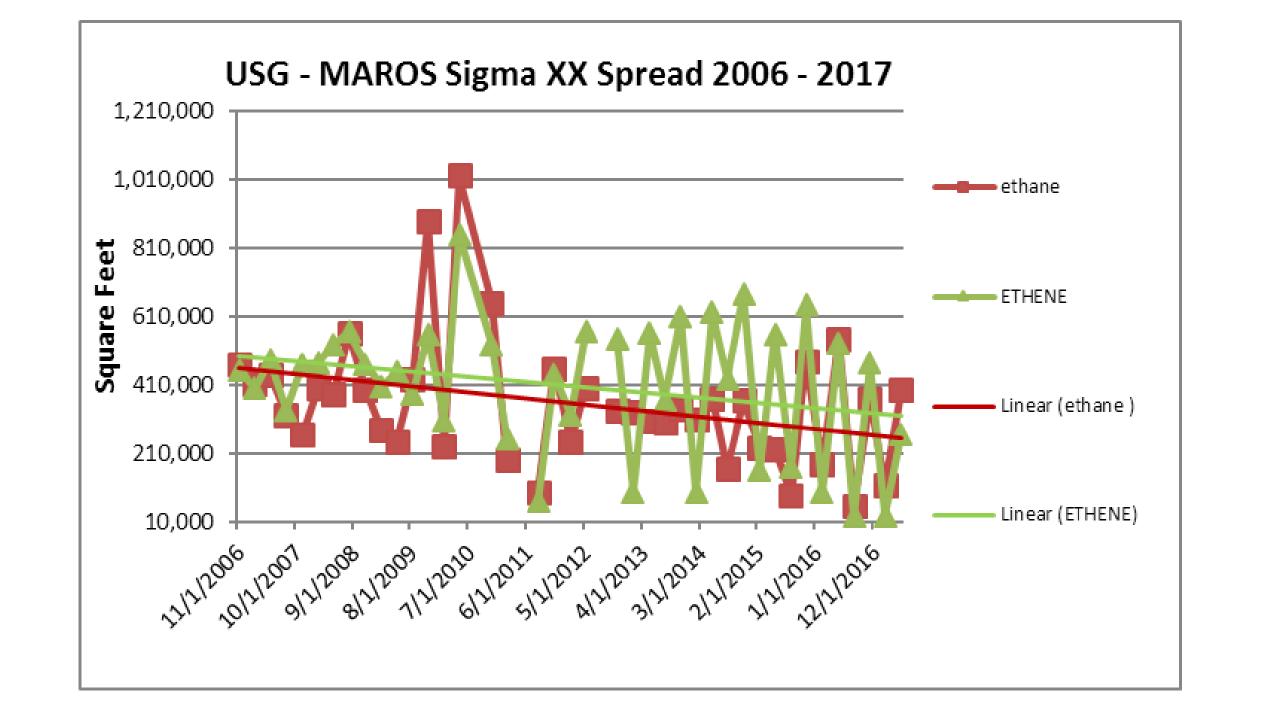


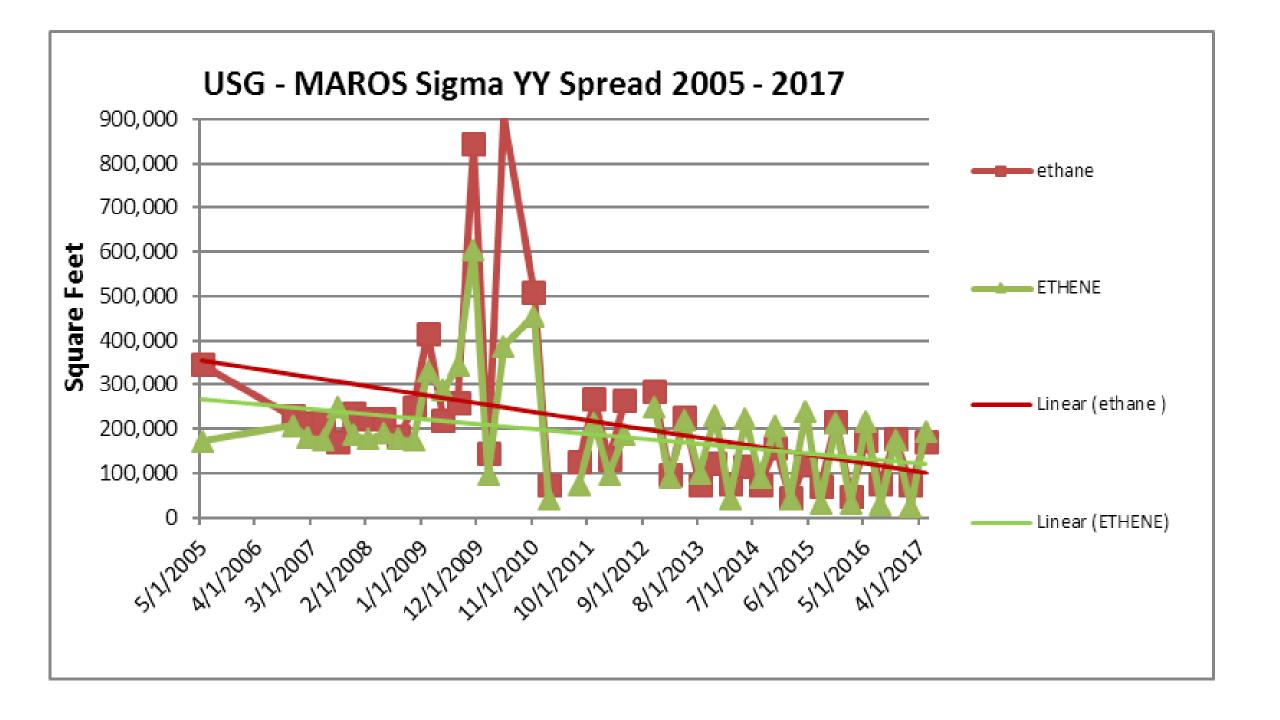


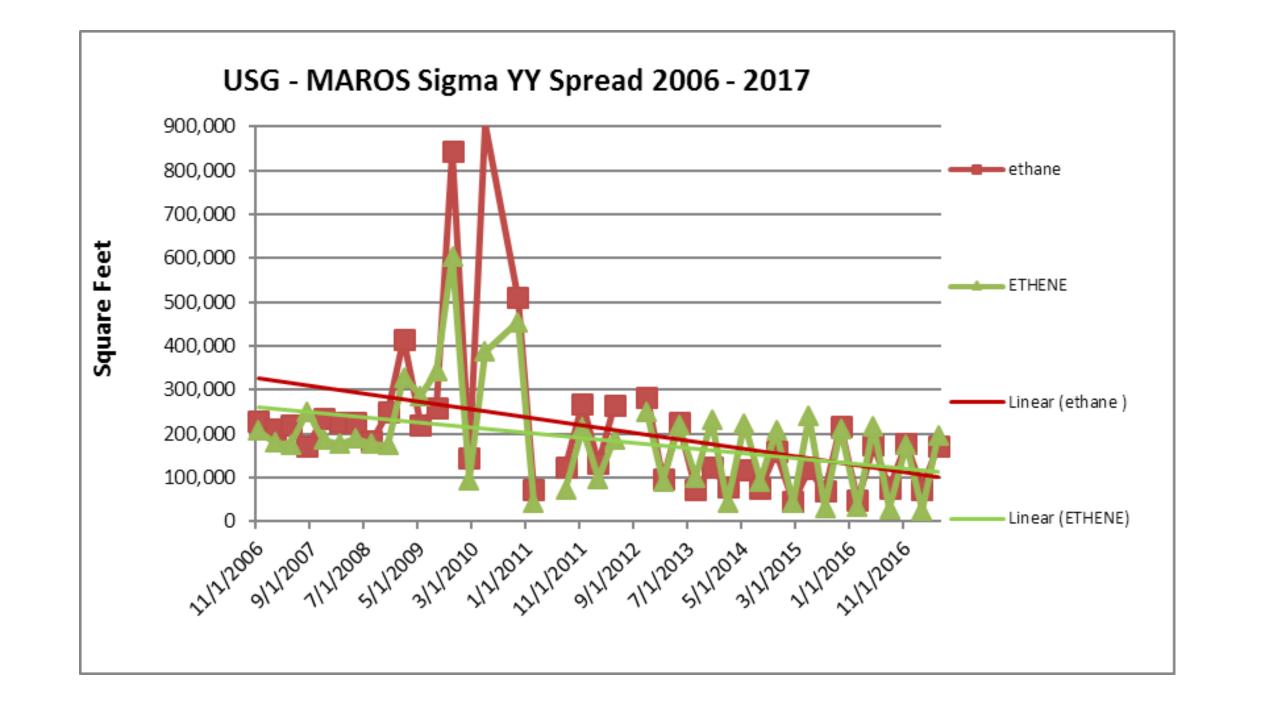












MAROS OUTPUT FILES – USG Aquifer

- A) MAROS Statistical Trend Analysis Summary
- **B) MAROS Spatial Moment Analysis Summary**
 - C) MAROS Site Results

Project: GE Evendale User Name: CSY Location: Evendale State: Ohio

Time Period: 6/1/2006 to 7/7/2017

Consolidation Period: Quarterly

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values: **Actual Value**

Well	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHANE								
AF-11S	Т	26	14	2.7E-11	9.0E-12	No	D	D
AF-12S	Т	3	3	1.1E-10	7.1E-11	No	N/A	N/A
AF-13S	T	23	0	2.0E-11	1.4E-13	Yes	ND	ND
AF-14S	Т	3	0	8.1E-11	8.1E-11	Yes	ND	ND
AF-15S	S	1	1	3.1E-11	3.1E-11	No	N/A	N/A
AF-19S	Т	23	7	4.8E-12	1.4E-13	No	D	D
AF-1S	S	2	2	7.3E-11	7.3E-11	No	N/A	N/A
AF-2S	S	2	2	1.7E-10	1.7E-10	No	N/A	N/A
AF-3S	S	2	1	5.9E-11	5.9E-11	No	N/A	N/A
AF-4S	S	25	21	1.3E-10	9.0E-11	No	D	D
AF-5S	S	36	36	3.1E-10	7.9E-11	No	D	D
AF-6S	S	22	3	1.5E-11	1.4E-13	No	D	D
AF-7S	S	39	37	4.9E-10	1.9E-10	No	D	D
AF-8S	T	3	1	4.9E-11	5.1E-11	No	N/A	N/A
AF-9S	T	39	33	1.2E-11	6.7E-12	No	NT	D
GM-1	S	1	1	6.7E-12	6.7E-12	No	N/A	N/A
GM-10S	S	1	1	1.9E-10	1.9E-10	No	N/A	N/A
GM-11S	S	3	0	8.1E-11	8.1E-11	Yes	ND	ND
GM-3S	S	2	2	4.0E-11	4.0E-11	No	N/A	N/A
GM-7S	S	2	0	8.1E-11	8.1E-11	Yes	ND	ND
GM-9S	S	5	5	3.0E-11	1.7E-11	No	NT	NT
H-222	Т	5	5	8.2E-10	7.7E-10	No	NT	1
OSMW-10S	Т	26	26	9.0E-10	7.6E-10	No	D	D
OSMW-11S	Т	25	24	4.2E-10	2.8E-10	No	D	D
OSMW-12S	Т	4	4	8.3E-10	8.4E-10	No	S	PD
OSMW-13S	Т	4	4	3.5E-10	3.8E-10	No	S	D

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Project: GE Evendale User Name: CSY

Location: Evendale State: Ohio

	Source /	Number of	Number	Average	Madian Cons	All	Mann-	Linear
Well Name	Tail	Samples	of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	"ND" ?	Kendall Trend	Regression Trend
ETHANE								
OSMW-1S	Т	38	30	1.1E-09	2.4E-10	No	D	D
OSMW-3S	Т	37	19	1.7E-11	9.0E-12	No	D	D
OSMW-4S	Т	36	25	1.5E-10	1.8E-11	No	D	D
OSMW-5S	Т	28	27	2.1E-11	1.6E-11	No	1	1
OSMW-6S	Т	28	28	4.9E-10	6.1E-10	No	D	D
OSMW-8S	Т	28	28	4.3E-11	1.8E-11	No	1	1
OSMW-9S	Т	26	14	7.3E-11	2.1E-11	No	D	D
PMW-3S	Т	29	29	5.3E-10	3.1E-10	No	D	D
TMW-1S	S	38	19	8.9E-11	2.6E-11	No	D	D
TMW-2S	Т	38	7	2.7E-11	1.9E-12	No	D	D
ETHENE								
AF-11S	Т	26	26	1.2E-09	2.0E-10	No	D	D
AF-12S	Т	3	3	1.4E-09	1.3E-09	No	N/A	N/A
AF-13S	Т	23	23	1.8E-10	1.5E-10	No	D	S
AF-14S	Т	3	0	7.2E-11	7.2E-11	Yes	ND	ND
AF-15S	S	1	1	7.8E-09	7.8E-09	No	N/A	N/A
AF-19S	Т	22	22	1.9E-10	1.7E-10	No	NT	NT
AF-1S	S	2	1	5.8E-11	5.8E-11	No	N/A	N/A
AF-2S	S	2	2	9.4E-10	9.4E-10	No	N/A	N/A
AF-3S	S	2	0	7.2E-11	7.2E-11	Yes	ND	ND
AF-4S	S	25	22	6.8E-10	4.5E-10	No	D	D
AF-5S	S	36	36	1.3E-09	8.0E-10	No	D	D
AF-6S	S	22	12	1.7E-11	1.5E-11	No	D	D
AF-7S	S	39	39	1.9E-08	1.9E-08	No	D	D
AF-8S	Т	3	2	6.6E-11	7.2E-11	No	N/A	N/A
AF-9S	Т	39	32	1.4E-10	9.6E-11	No	NT	D
GM-1	S	1	0	7.2E-11	7.2E-11	Yes	ND	ND
GM-10S	S	1	0	7.2E-11	7.2E-11	Yes	ND	ND
GM-11S	S	3	0	7.2E-11	7.2E-11	Yes	ND	ND
GM-3S	S	2	0	7.2E-11	7.2E-11	Yes	ND	ND
GM-7S	S	2	0	7.2E-11	7.2E-11	Yes	ND	ND
GM-9S	S	5	5	1.5E-09	1.4E-09	No	NT	NT

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Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

Well Name	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHENE								
H-222	Т	5	5	1.6E-09	1.6E-09	No	S	PD
OSMW-10S	Т	26	26	6.4E-10	4.2E-10	No	D	NT
OSMW-11S	Т	25	25	2.7E-09	2.3E-09	No	D	S
OSMW-12S	Т	4	4	3.2E-09	3.2E-09	No	S	S
OSMW-13S	Т	4	4	5.5E-09	5.5E-09	No	S	S
OSMW-1S	Т	38	38	1.9E-08	1.7E-08	No	D	D
OSMW-3S	Т	37	33	5.9E-11	4.1E-11	No	D	D
OSMW-4S	Т	36	29	2.0E-09	5.8E-10	No	D	D
OSMW-5S	Т	28	28	1.9E-10	1.7E-10	No	1	1
OSMW-6S	Т	28	28	8.8E-10	1.0E-09	No	D	D
OSMW-8S	Т	28	28	1.3E-10	1.1E-10	No	D	D
OSMW-9S	Т	26	22	1.7E-09	1.9E-09	No	S	S
PMW-3S	Т	29	29	1.1E-09	1.0E-09	No	D	D
TMW-1S	S	38	38	1.8E-09	5.6E-10	No	D	D
TMW-2S	Т	38	14	2.5E-11	1.5E-11	No	D	D

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (ND)

The Number of Samples and Number of Detects shown above are post-consolidation values.

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	Oth Moment	1st Mom	ent (Center	of Mass)	2nd Moment (Spread)		
	Estimated			Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHANE							
8/15/2007	3.8E-08	1,417,108	455,021	1,130	323,336	171,930	10
11/15/2007	2.5E-08	1,416,434	455,106	1,603	265,771	235,529	10
2/15/2008	3.1E-08	1,416,618	455,088	1,454	398,399	224,645	11
5/15/2008	3.3E-08	1,416,519	455,033	1,567	383,602	224,736	11
8/15/2008	2.4E-07	1,416,769	455,227	1,252	560,750	182,762	11
11/15/2008	3.4E-08	1,416,519	455,088	1,538	397,721	248,937	11
2/15/2009	5.9E-08	1,416,711	455,050	1,399	277,858	416,473	13
5/15/2009	5.4E-08	1,416,571	454,835	1,643	242,591	220,196	12
8/15/2009	7.6E-08	1,416,792	454,997	1,370	427,056	259,817	16
11/15/2009	2.0E-07	1,417,208	455,476	749	885,880	844,438	29
2/15/2010	9.1E-08	1,417,582	455,794	268	232,351	146,205	13
5/15/2010	1.2E-07	1,417,360	455,656	527	1,020,495	905,830	25
11/15/2010	1.2E-07	1,417,120	455,369	881	648,576	509,705	21
2/15/2011	7.8E-09	1,416,734	455,499	1,165	189,821	73,017	7
5/15/2011	0.0E+00						5
8/15/2011	1.5E-08	1,417,364	455,755	488	97,687	125,145	13
11/15/2011	3.5E-08	1,416,727	455,175	1,316	459,092	268,138	17
2/15/2012	2.8E-08	1,417,142	455,555	767	245,060	131,930	16
5/15/2012	7.4E-08	1,416,793	455,113	1,297	401,887	264,063	20
8/15/2012	0.0E+00						1
11/15/2012	7.1E-08	1,416,704	455,007	1,432	334,614	284,116	19
2/15/2013	2.4E-08	1,417,018	455,533	888	331,730	95,944	17
5/15/2013	4.6E-08	1,416,763	454,916	1,445	305,757	225,852	18
8/15/2013	4.1E-09	1,417,120	455,463	830	299,800	74,522	17
11/15/2013	3.5E-08	1,416,549	454,743	1,720	340,121	122,862	20
2/15/2014	1.7E-09	1,417,317	455,495	648	307,451	77,611	17
5/15/2014	2.2E-08	1,416,521	454,753	1,734	371,237	117,568	20
8/15/2014	2.9E-09	1,417,474	455,436	577	164,256	74,991	17
11/15/2014	1.8E-08	1,416,565	454,743	1,708	363,714	159,979	20
2/15/2015	2.6E-09	1,417,450	455,372	642	226,947	45,032	17
5/15/2015	1.2E-08	1,416,197	454,712	2,014	222,887	119,990	20
8/15/2015	3.3E-09	1,417,661	455,432	486	88,448	69,174	17
11/15/2015	1.2E-08	1,416,511	454,780	1,725	480,839	218,496	20

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Sunday, August 20, 2017

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	0th Moment	1st Moment (Center of Mass)		2nd Moment (Spread)			
	Estimated		46.3	Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHANE							
2/15/2016	2.2E-09	1,417,606	455,606	361	177,626	48,810	17
5/15/2016	1.2E-08	1,416,465	454,789	1,754	544,432	174,658	20
8/15/2016	2.8E-09	1,417,699	455,475	433	57,618	77,173	17
11/15/2016	8.4E-09	1,416,386	454,698	1,873	372,260	176,952	20
2/15/2017	1.2E-09	1,417,689	455,679	253	116,874	74,544	17
5/15/2017	5.4E-09	1,416,467	454,730	1,790	394,051	172,923	17
ETHENE							
8/15/2007	1.6E-07	1,416,537	455,159	1,487	336,037	250,582	10
11/15/2007	3.8E-07	1,416,938	455,247	1,101	472,288	186,826	11
2/15/2008	4.5E-07	1,416,996	455,263	1,044	472,622	177,010	11
5/15/2008	4.6E-07	1,416,854	455,225	1,182	527,093	189,864	11
8/15/2008	2.9E-07	1,416,775	455,249	1,236	563,924	177,424	11
11/15/2008	4.4E-07	1,416,773	455,181	1,274	472,189	174,371	10
2/15/2009	4.7E-07	1,416,983	455,280	1,045	405,991	329,541	13
5/15/2009	4.8E-07	1,416,965	455,255	1,074	448,059	286,917	13
8/15/2009	5.4E-07	1,417,055	455,373	933	384,150	342,850	15
11/15/2009	6.5E-07	1,417,465	455,607	462	555,257	604,802	30
2/15/2010	3.3E-07	1,417,619	455,816	226	305,544	95,281	13
5/15/2010	6.1E-07	1,417,232	455,525	702	850,162	386,890	25
11/15/2010	7.1E-07	1,417,168	455,693	693	527,906	454,763	20
2/15/2011	7.9E-08	1,416,959	455,703	893	252,859	41,724	8
5/15/2011	0.0E+00						4
8/15/2011	1.5E-07	1,417,528	455,511	484	68,714	73,397	13
11/15/2011	2.5E-07	1,416,918	455,176	1,159	439,241	213,124	17
2/15/2012	1.5E-07	1,417,266	455,510	681	323,927	98,138	17
5/15/2012	5.8E-07	1,416,948	455,268	1,080	563,976	188,301	19
8/15/2012	0.0E+00						1
11/15/2012	4.9E-07	1,416,809	455,232	1,215	545,160	249,105	20
2/15/2013	2.3E-07	1,417,543	455,497	486	96,659	91,549	15
5/15/2013	3.4E-07	1,416,942	455,120	1,176	560,205	218,988	20
8/15/2013	1.9E-07	1,417,317	455,538	623	366,206	100,519	16
11/15/2013	4.3E-07	1,416,821	455,197	1,225	608,888	231,238	20

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Release 352, September 2012

Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

	Oth Moment	1st Moment (Center of Mass)		2nd Moment (Spread)			
Effective Date	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
ETHENE							
2/15/2014	1.2E-07	1,417,633	455,404	523	95,329	42,217	17
5/15/2014	2.5E-07	1,416,843	455,199	1,206	620,375	223,323	20
8/15/2014	1.7E-07	1,417,200	455,568	709	428,645	91,443	17
11/15/2014	2.4E-07	1,416,803	455,119	1,285	672,977	207,026	20
2/15/2015	1.1E-07	1,417,514	455,451	540	159,633	42,923	17
5/15/2015	1.4E-07	1,416,713	455,063	1,391	559,265	239,937	20
8/15/2015	1.6E-07	1,417,565	455,405	552	169,599	31,768	17
11/15/2015	1.9E-07	1,416,915	455,155	1,174	642,136	212,397	20
2/15/2016	1.3E-07	1,417,637	455,425	503	95,771	33,076	17
5/15/2016	1.7E-07	1,417,205	455,218	918	531,478	217,677	20
8/15/2016	1.3E-07	1,417,699	455,390	515	25,946	28,574	17
11/15/2016	2.1E-07	1,417,236	455,127	967	474,938	175,237	20
2/15/2017	1.5E-07	1,417,697	455,403	503	27,641	25,685	17
5/15/2017	1.7E-07	1,417,385	455,139	872	266,884	195,382	17

Project: GE Evendale User Name: CSY
Location: Evendale State: Ohio

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	ETHANE	1.32	-314	100.0%	D
0th Moment	ETHENE	0.64	-230	99.8%	D
First Moment	ETHANE	0.45	-12	55.7%	S
First Moment	ETHENE	0.36	-110	92.3%	PD
Second Moment X	ETHANE	0.56	-128	95.2%	D
Second Moment X	ETHENE	0.50	-76	83.5%	S
Second Moment Y	ETHANE	0.89	-234	99.9%	D
Second Moment Y	ETHENE	0.68	-180	99.1%	D

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.30 Saturated Thickness: Uniform: 15 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 3151 ft/yr
Current Plume Length: 2800 ft
Current Plume Width: 1250 ft
Number of Tail Wells: 20

Number of Source Wells: 20

Down Gradient Information:

Distance from Edge of Tail to Nearest:

Down-gradient Receptor: 200 ft
Down-gradient Property: -2300 ft

Distance from Source to Nearest:

Down Gradient Receptor: 3450 ft Down Gradient Property: 950 ft

Source Information:

Source Treatment: Pump and Treat NAPL is not observed at this site.

Data Consolidation Assumptions:

Time Period: 6/1/2007 to 7/7/2017

Consolidation Period: Quarterly

Consolidation Type: Geometric Mean

Duplicate Average

Consolidation:

ND Values: 1/2 Detection Limit

J Flag Values: Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical

Summary Weighting:

Weighting Applied to All Chemicals Equally

Consolidation Step 2. Weight Well Information by Chemical

Well Weighting:

No Weighting of Wells was Applied.

Chemical Weighting:

No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

сос	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
ETHANE	PD	D	L	n mechanism unitl reach sta	No Recommendation	39
ETHENE	PD	PD	L	n mechanism unitl reach sta	No Recommendation	39

Level of Monitoring Effort Indicated by Analysis: Limited

2. Spatial Moment Analysis Results:

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	ETHANE	1.32	-314	100.0%	D
0th Moment	ETHENE	0.64	-230	99.8%	D
First Moment	ETHANE	0.45	-12	55.7%	S
First Moment	ETHENE	0.36	-110	92.3%	PD
Second Moment X	ETHANE	0.56	-128	95.2%	D
Second Moment X	ETHENE	0.50	-76	83.5%	S
Second Moment Y	ETHANE	0.89	-234	99.9%	D
Second Moment Y	ETHENE	0.68	-180	99.1%	D

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

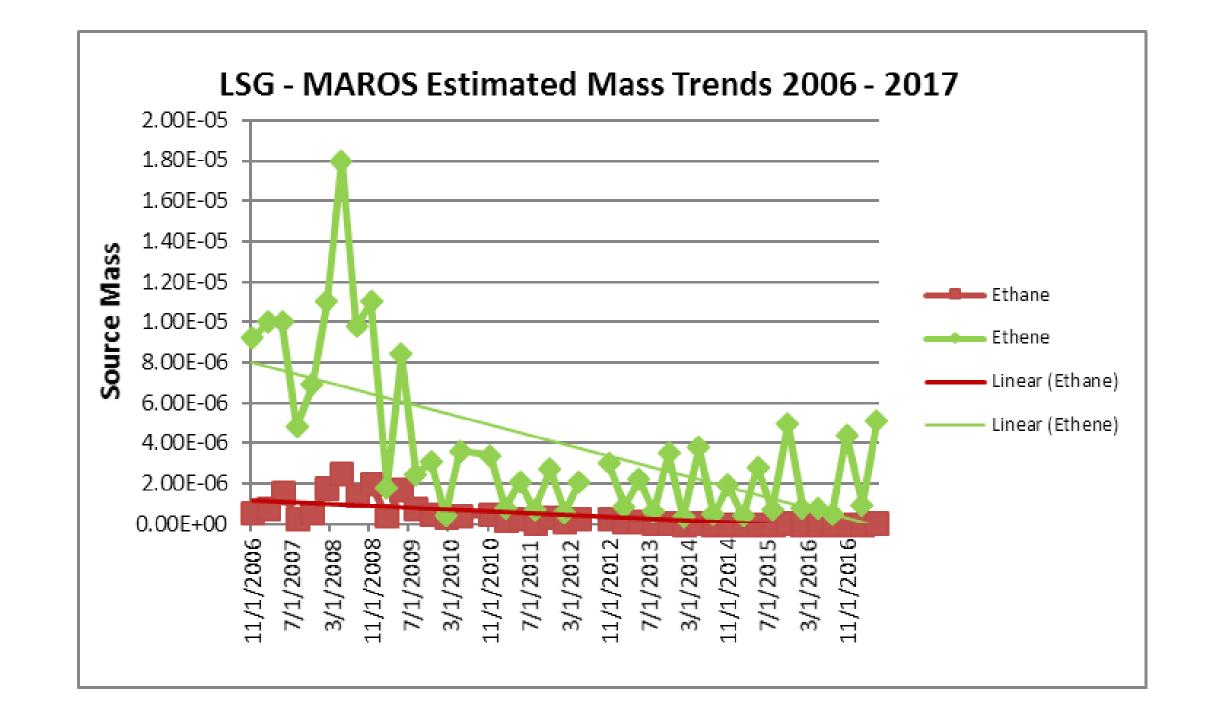
Porosity: 0.30 **Saturated Thickness:** Uniform: 15 ft

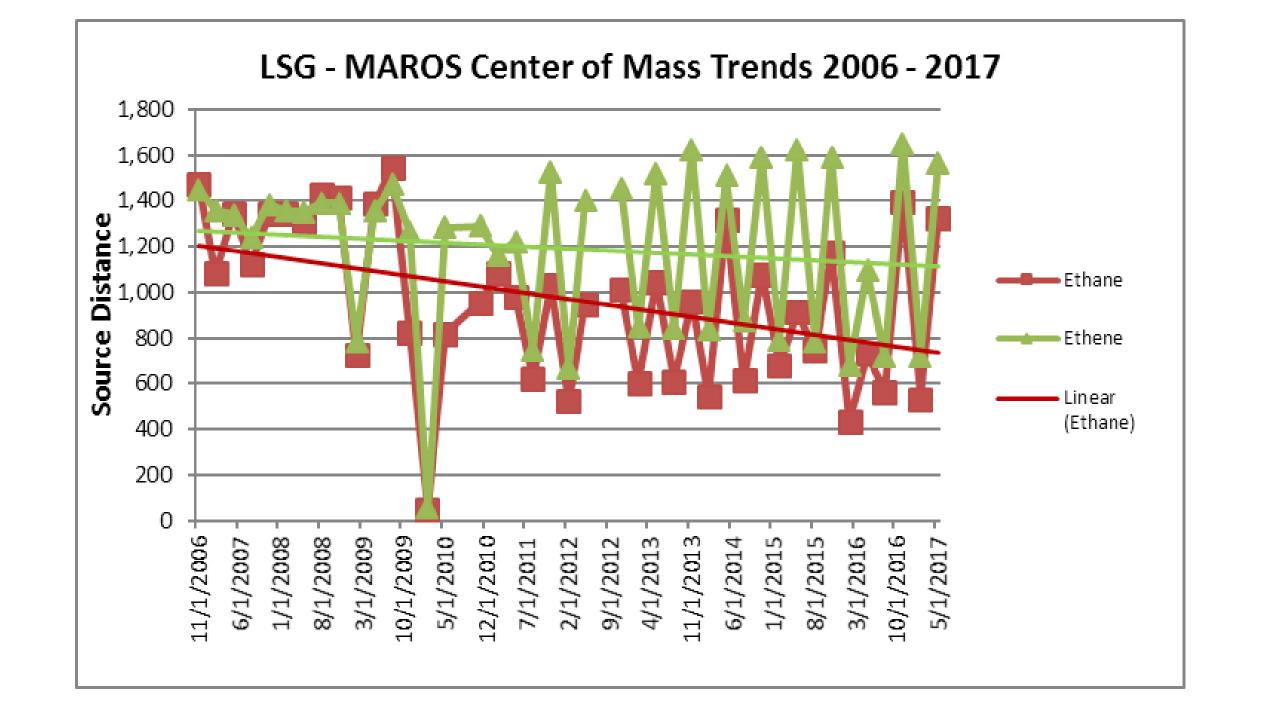
Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

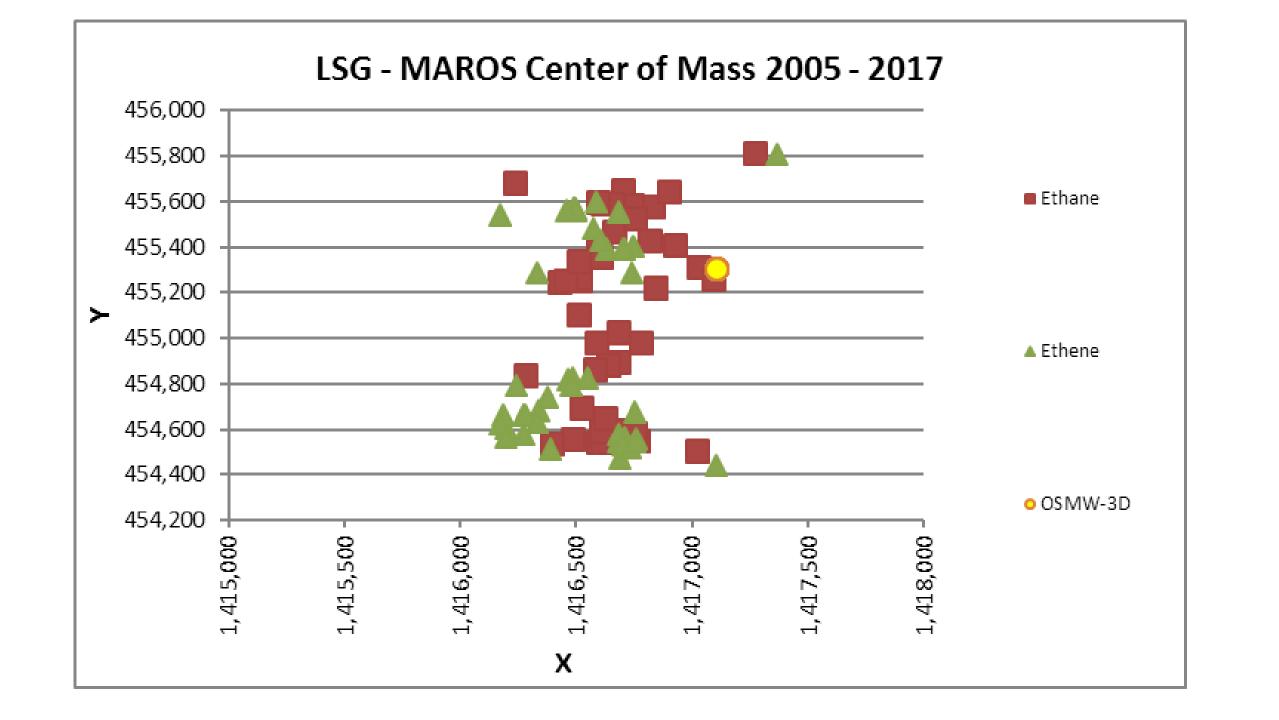
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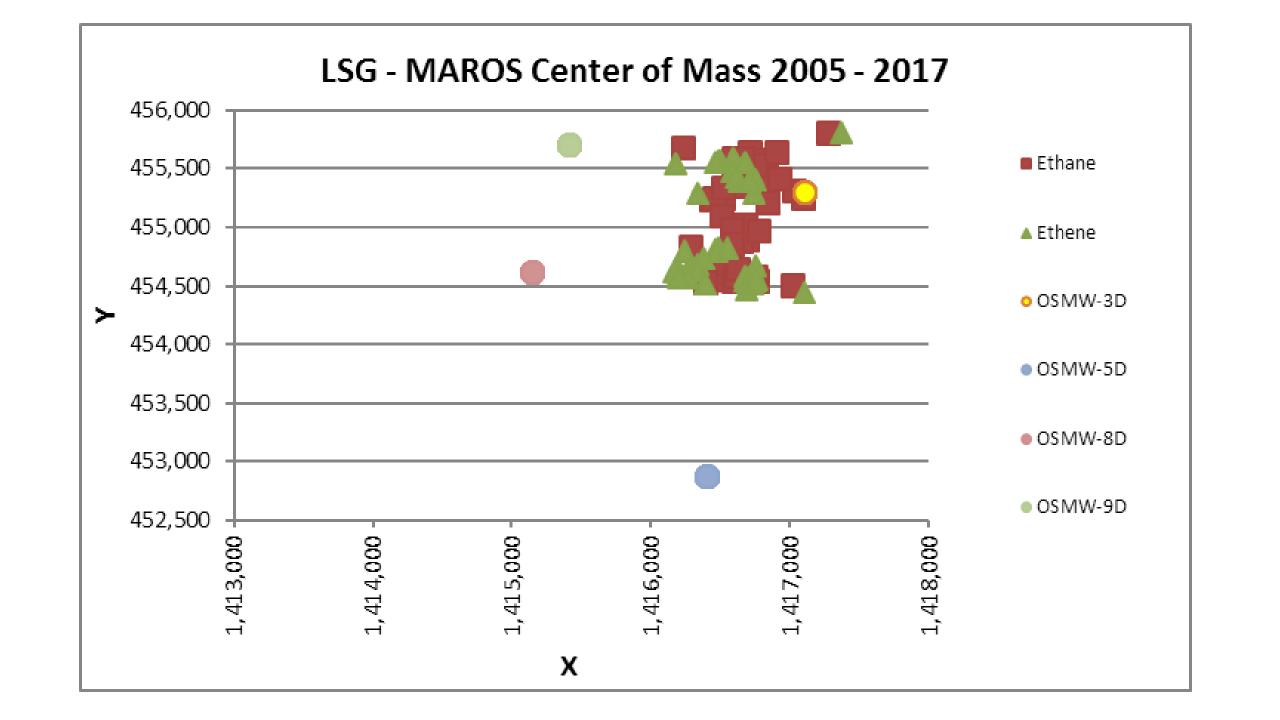
LSG AQUIFER SUPPORTING INFORMATION

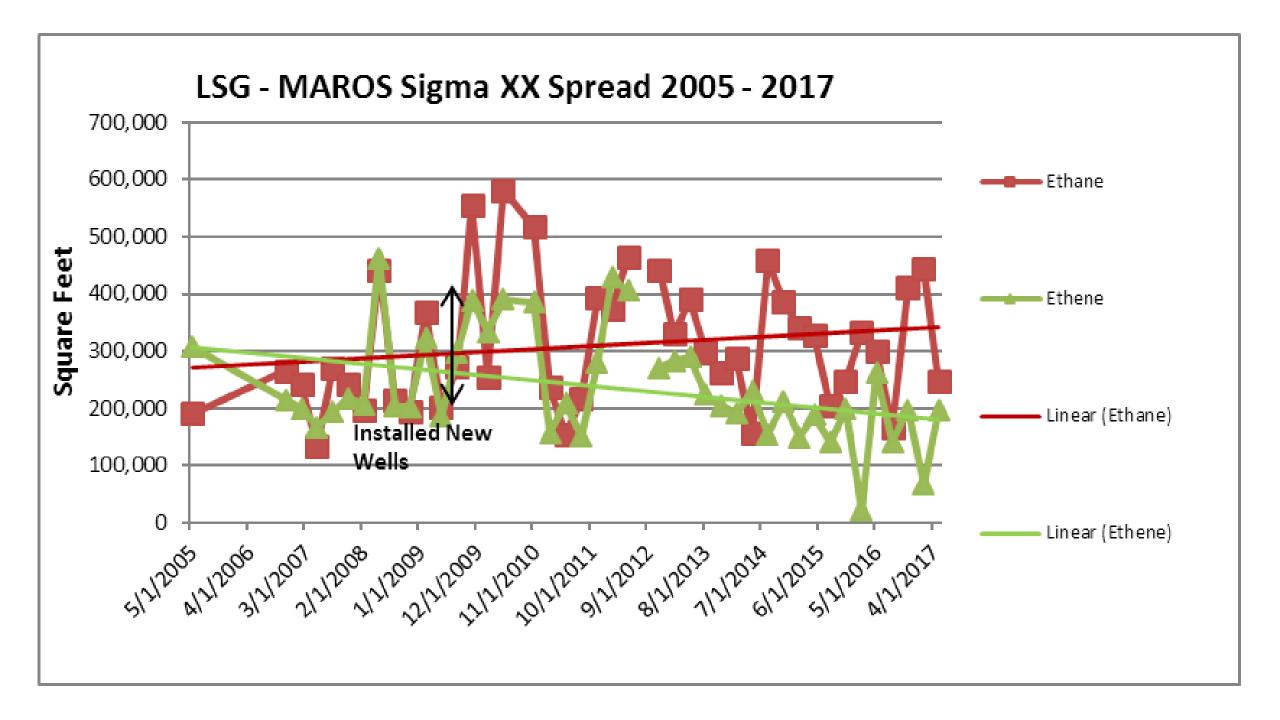
- A) Plume Mass Estimate Charts
- B) Center of Mass Charts and Plot
 - C) Spread of Plume Charts

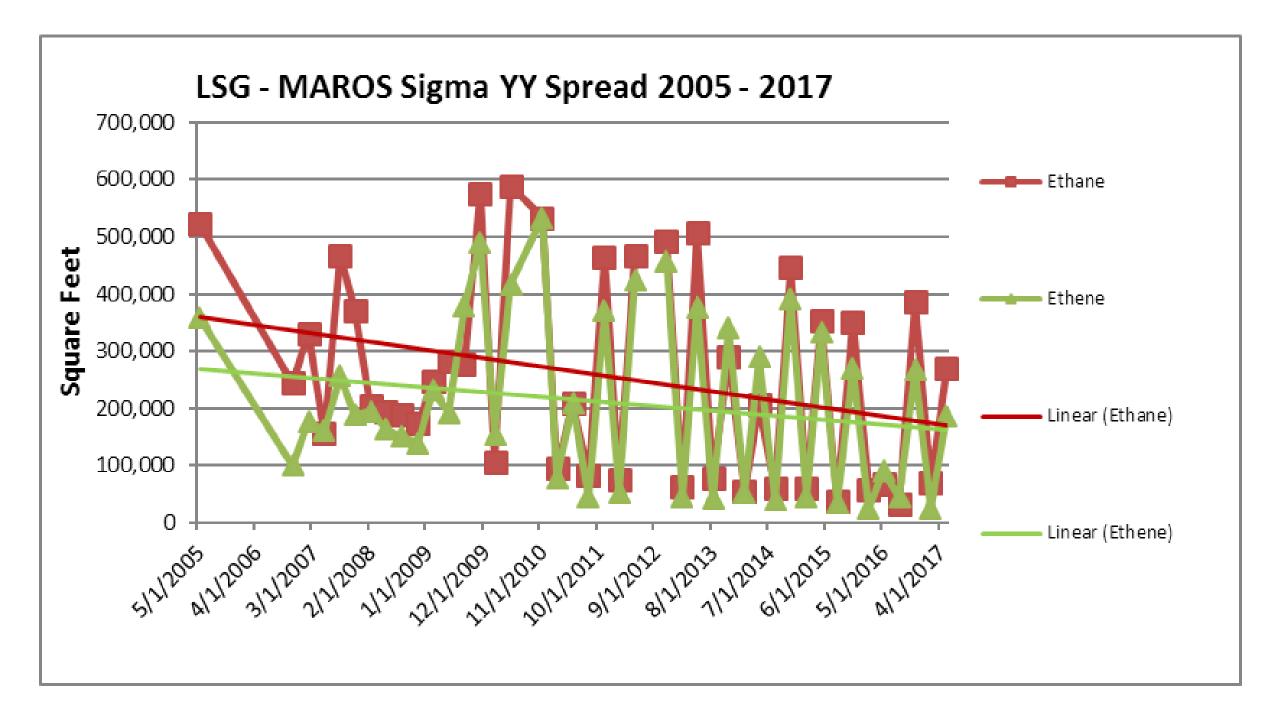












MAROS OUTPUT FILES – LSG Aquifer

- A) MAROS Statistical Trend Analysis Summary
- **B) MAROS Spatial Moment Analysis Summary**
 - C) MAROS Site Results

MAROS Statistical Trend Analysis Summary

Project: GE Evendale User Name: CSY Location: Evendale State: Ohio

Time Period: 6/1/2006 to 7/7/2017

Consolidation Period: Quarterly

Consolidation Type: Geometric Mean

Duplicate Consolidation: Average

ND Values: 1/2 Detection Limit

J Flag Values: **Actual Value**

Well	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHANE								
AF-11D	Т	24	14	8.3E-12	5.9E-12	No	D	D
AF-12D	Т	1	1	2.9E-12	2.9E-12	No	N/A	N/A
AF-15D	S	3	3	1.5E-11	1.5E-11	No	N/A	N/A
AF-19D	Т	23	0	2.0E-11	1.4E-13	Yes	ND	ND
AF-1D	S	4	4	3.2E-11	3.6E-11	No	S	PD
AF-21D	T	26	15	1.7E-11	4.9E-12	No	NT	D
AF-5D	S	28	1	4.1E-11	5.1E-11	No	PD	D
AF-7D	S	39	4	3.2E-11	2.0E-11	No	D	D
AF-8D	T	1	1	1.2E-11	1.2E-11	No	N/A	N/A
AF-9D	T	1	0	5.1E-11	5.1E-11	Yes	ND	ND
EW3	T	1	1	6.2E-11	6.2E-11	No	N/A	N/A
GM-3D	S	4	1	5.4E-11	5.1E-11	No	NT	I
H-223	T	1	0	8.1E-11	8.1E-11	Yes	ND	ND
OSMW-10D	T	29	13	6.4E-11	4.7E-11	No	NT	D
OSMW-11D	T	26	25	3.2E-10	2.9E-10	No	D	D
OSMW-11DD	T	4	4	2.5E-10	3.0E-10	No	1	NT
OSMW-12D	S	4	0	8.1E-11	8.1E-11	Yes	ND	ND
OSMW-12DD	S	4	4	4.8E-11	4.8E-11	No	S	S
OSMW-13D	T	4	4	1.2E-10	9.5E-11	No	S	S
OSMW-13DD	T	4	4	1.8E-10	1.5E-10	No	S	S
OSMW-1D	T	39	39	1.5E-10	4.0E-11	No	D	D
OSMW-3D	T	38	29	5.3E-10	4.5E-11	No	D	D
OSMW-4D	T	38	37	7.9E-11	8.7E-11	No	D	D
OSMW-5D	T	26	11	3.4E-10	8.0E-12	No	D	D
OSMW-6D	T	38	38	2.1E-10	1.3E-10	No	D	D
OSMW-7D	Т	27	0	4.3E-11	5.1E-11	Yes	ND	ND

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MAROS Statistical Trend Analysis Summary

Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

Well Name	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHANE								
OSMW-8D	Т	28	6	3.9E-11	5.1E-11	No	S	D
OSMW-9D	Т	27	0	3.1E-11	1.4E-13	Yes	ND	ND
PMW-2D	Т	23	5	1.7E-11	1.4E-13	No	D	D
PMW-3D	Т	29	29	6.6E-10	3.6E-10	No	D	D
PMW-4D	Т	27	0	2.8E-11	1.4E-13	Yes	ND	ND
TMW-1D	S	37	0	3.4E-11	5.1E-11	Yes	ND	ND
TMW-2D	Т	38	8	1.5E-10	1.2E-11	No	D	D
ETHENE								
AF-11D	Т	24	19	3.9E-11	3.1E-11	No	D	D
AF-12D	Т	1	1	8.2E-11	8.2E-11	No	N/A	N/A
AF-15D	S	3	3	9.2E-11	9.2E-11	No	N/A	N/A
AF-19D	Т	23	0	1.7E-11	1.4E-13	Yes	ND	ND
AF-1D	S	4	0	7.2E-11	7.2E-11	Yes	ND	ND
AF-21D	Т	26	19	1.0E-10	9.8E-11	No	D	D
AF-5D	S	28	3	3.3E-11	4.5E-11	No	D	D
AF-7D	S	39	8	2.6E-11	1.1E-11	No	D	D
AF-8D	Т	1	1	1.5E-09	1.5E-09	No	N/A	N/A
AF-9D	Т	1	1	5.5E-12	5.5E-12	No	N/A	N/A
EW3	Т	1	1	4.8E-10	4.8E-10	No	N/A	N/A
GM-3D	S	4	1	4.5E-11	4.5E-11	No	NT	NT
H-223	Т	1	0	7.2E-11	7.2E-11	Yes	ND	ND
OSMW-10D	Т	29	29	9.2E-11	3.1E-11	No	1	1
OSMW-11D	Т	26	26	2.8E-09	2.4E-09	No	D	D
OSMW-11DD	Т	4	4	2.3E-09	2.8E-09	No	1	NT
OSMW-12D	S	4	4	4.1E-10	4.1E-10	No	S	D
OSMW-12DD	S	4	1	6.2E-11	7.2E-11	No	S	NT
OSMW-13D	Т	4	4	1.8E-09	1.7E-09	No	S	NT
OSMW-13DD	Т	4	4	2.9E-09	2.9E-09	No	S	S
OSMW-1D	Т	39	39	6.6E-09	3.5E-09	No	D	D
OSMW-3D	Т	38	38	5.2E-09	5.0E-09	No	D	D
OSMW-4D	Т	38	38	7.4E-10	7.7E-10	No	D	D
OSMW-5D	Т	26	26	2.6E-09	2.8E-09	No	D	1

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MAROS Statistical Trend Analysis Summary

Project: GE Evendale User Name: CSY

Location: Evendale State: Ohio

Well Name	Source / Tail	Number of Samples	Number of Detects	Average Conc. (mg/L)	Median Conc. (mg/L)	All Samples "ND" ?	Mann- Kendall Trend	Linear Regression Trend
ETHENE								
OSMW-6D	Т	38	38	2.0E-09	2.1E-09	No	NT	S
OSMW-7D	Т	27	25	1.0E-10	1.1E-10	No	D	S
OSMW-8D	T	28	28	5.5E-10	4.7E-10	No	1	1
OSMW-9D	Т	27	27	2.6E-10	2.2E-10	No	D	D
PMW-2D	Т	23	1	1.6E-11	1.4E-13	No	D	D
PMW-3D	Т	29	29	1.3E-09	8.0E-10	No	D	D
PMW-4D	Т	27	27	6.3E-11	5.8E-11	No	D	D
TMW-1D	S	37	10	2.0E-11	1.7E-12	No	D	D
TMW-2D	Т	38	36	4.8E-09	5.3E-09	No	1	1

Note: Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A) - Due to insufficient Data (< 4 sampling events); No Detectable Concentration (ND)

The Number of Samples and Number of Detects shown above are post-consolidation values.

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	Oth Moment	1st Moment (Center of Mass)		2nd Mom			
	Estimated			Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHANE							
11/15/2006	5.4E-07	1,416,488	454,559	1,474	265,510	244,467	13
2/15/2007	8.0E-07	1,416,684	454,899	1,083	241,760	331,139	12
5/15/2007	1.6E-06	1,416,764	454,551	1,347	133,525	155,690	12
8/15/2007	2.7E-07	1,416,642	454,883	1,121	270,828	468,293	12
11/15/2007	5.3E-07	1,416,525	454,693	1,343	242,162	371,700	12
2/15/2008	1.8E-06	1,416,681	454,596	1,343	195,398	203,770	12
5/15/2008	2.5E-06	1,417,020	454,504	1,311	441,808	193,803	13
8/15/2008	1.4E-06	1,416,594	454,546	1,429	213,596	188,824	12
11/15/2008	2.0E-06	1,416,613	454,547	1,419	194,981	173,774	12
2/15/2009	4.1E-07	1,416,614	455,592	724	367,882	246,262	11
5/15/2009	1.7E-06	1,416,605	454,588	1,387	202,686	282,961	13
8/15/2009	7.7E-07	1,416,394	454,537	1,546	271,565	278,074	17
11/15/2009	4.9E-07	1,416,592	455,385	822	555,654	575,514	26
2/15/2010	3.1E-07	1,417,274	455,815	51	254,937	106,880	13
5/15/2010	4.1E-07	1,416,609	455,360	820	581,572	589,661	24
11/15/2010	5.2E-07	1,416,516	455,251	957	517,059	532,954	24
2/15/2011	1.7E-07	1,416,236	455,684	1,082	236,506	95,159	9
5/15/2011	2.6E-07	1,416,683	455,027	983	153,155	208,573	6
8/15/2011	8.6E-08	1,416,706	455,649	621	216,967	81,909	11
11/15/2011	3.2E-07	1,416,431	455,246	1,032	393,591	465,116	18
2/15/2012	1.3E-07	1,416,831	455,577	523	373,906	75,982	14
5/15/2012	2.8E-07	1,416,517	455,265	948	463,754	468,322	19
8/15/2012	0.0E+00						1
11/15/2012	2.9E-07	1,416,452	455,253	1,010	442,179	491,354	19
2/15/2013	9.9E-08	1,416,740	455,583	606	329,889	62,954	15
5/15/2013	1.6E-07	1,416,510	455,107	1,048	390,336	506,381	20
8/15/2013	1.8E-08	1,416,815	455,427	611	296,897	77,443	15
11/15/2013	3.0E-08	1,416,779	454,981	962	262,516	291,156	20
2/15/2014	1.0E-08	1,417,030	455,312	547	287,137	54,142	15
5/15/2014	5.7E-08	1,416,756	454,587	1,317	155,436	205,730	20
8/15/2014	5.1E-09	1,416,752	455,527	616	458,942	59,337	15
11/15/2014	1.2E-08	1,416,587	454,982	1,080	385,602	446,405	20
2/15/2015	6.2E-09	1,416,659	455,593	680	340,610	59,534	15

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Friday, August 18, 2017

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	0th Moment	1st Moment (Center of Mass)		2nd Mom	ent (Spread)		
Effective Date	Estimated	Vo (ft)	Vo (ft)	Source	Sigma XX	Sigma YY (sq	Number of
Effective Date	Mass (Kg)	Xc (ft)	Yc (ft)	Distance	(sq ft)	ft)	Wells
ETHANE							
5/15/2015	9.9E-09	1,416,514	455,339	913	327,223	353,181	20
8/15/2015	1.0E-08	1,416,592	455,599	744	204,308	37,540	15
11/15/2015	2.3E-08	1,416,582	454,863	1,173	247,607	351,799	20
2/15/2016	3.8E-09	1,416,900	455,642	435	333,774	58,685	14
5/15/2016	1.1E-08	1,416,843	455,221	731	300,454	67,861	19
8/15/2016	6.9E-09	1,417,091	455,259	567	165,624	32,540	15
11/15/2016	1.1E-08	1,416,283	454,835	1,399	410,852	385,630	20
2/15/2017	4.1E-09	1,416,928	455,412	533	444,189	70,319	15
5/15/2017	2.8E-08	1,416,624	454,649	1,325	246,792	269,648	19
ETHENE							
11/15/2006	9.2E-06	1,416,687	454,473	1,450	215,058	99,905	13
2/15/2007	1.0E-05	1,416,707	454,566	1,358	199,647	177,131	12
5/15/2007	1.0E-05	1,416,759	454,559	1,341	166,215	160,408	12
8/15/2007	4.8E-06	1,416,757	454,674	1,239	193,616	256,663	12
11/15/2007	6.9E-06	1,416,681	454,548	1,385	217,038	188,180	12
2/15/2008	1.1E-05	1,416,681	454,581	1,357	207,835	194,970	12
5/15/2008	1.8E-05	1,417,107	454,444	1,352	462,309	163,507	13
8/15/2008	9.8E-06	1,416,703	454,531	1,391	203,809	150,986	12
11/15/2008	1.1E-05	1,416,734	454,517	1,390	202,012	138,657	12
2/15/2009	1.8E-06	1,416,631	455,390	787	322,698	231,470	11
5/15/2009	8.4E-06	1,416,754	454,547	1,355	186,242	191,615	13
8/15/2009	2.4E-06	1,416,336	454,679	1,472	297,396	377,494	17
11/15/2009	3.1E-06	1,416,486	454,825	1,264	389,699	490,763	26
2/15/2010	4.4E-07	1,417,366	455,804	58	333,792	154,888	13
5/15/2010	3.6E-06	1,416,465	454,817	1,284	390,905	417,653	24
11/15/2010	3.4E-06	1,416,477	454,795	1,292	385,162	533,655	24
2/15/2011	7.6E-07	1,416,174	455,542	1,164	156,698	78,798	9
5/15/2011	2.1E-06	1,416,550	454,827	1,221	208,613	208,661	6
8/15/2011	7.0E-07	1,416,590	455,600	746	150,425	44,369	11
11/15/2011	2.7E-06	1,416,274	454,661	1,528	279,626	370,937	18
2/15/2012	5.6E-07	1,416,682	455,553	671	428,655	52,623	14
5/15/2012	2.1E-06	1,416,376	454,741	1,400	405,589	424,940	19

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Friday, August 18, 2017

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

	0th Moment	1st Moment (Center of Mass)		2nd Moment (Spread)			
Effective Date	Estimated Mass (Kg)	Xc (ft)	Yc (ft)	Source Distance	Sigma XX (sq ft)	Sigma YY (sq ft)	Number of Wells
ETHENE							
8/15/2012	0.0E+00						1
11/15/2012	3.0E-06	1,416,243	454,794	1,456	270,872	457,493	19
2/15/2013	8.5E-07	1,416,489	455,571	850	283,717	43,800	15
5/15/2013	2.2E-06	1,416,283	454,664	1,520	288,862	376,236	20
8/15/2013	6.3E-07	1,416,498	455,563	843	223,639	42,263	15
11/15/2013	3.5E-06	1,416,198	454,602	1,623	204,423	340,683	20
2/15/2014	3.1E-07	1,416,501	455,565	840	190,880	52,265	15
5/15/2014	3.8E-06	1,416,333	454,632	1,511	228,261	290,115	20
8/15/2014	4.5E-07	1,416,463	455,563	878	153,997	39,023	15
11/15/2014	1.9E-06	1,416,184	454,663	1,589	211,310	392,238	20
2/15/2015	4.1E-07	1,416,578	455,485	792	149,321	44,034	15
5/15/2015	2.8E-06	1,416,171	454,626	1,624	188,222	332,346	20
8/15/2015	7.0E-07	1,416,610	455,427	787	140,120	34,054	15
11/15/2015	5.0E-06	1,416,272	454,576	1,592	198,589	269,028	20
2/15/2016	7.9E-07	1,416,749	455,404	679	21,679	23,915	14
5/15/2016	7.5E-07	1,416,333	455,290	1,097	261,376	90,629	19
8/15/2016	4.8E-07	1,416,710	455,388	720	141,217	44,844	15
11/15/2016	4.4E-06	1,416,197	454,565	1,650	197,444	266,667	20
2/15/2017	9.3E-07	1,416,705	455,394	721	67,233	25,966	15
5/15/2017	5.1E-06	1,416,391	454,514	1,567	196,223	186,925	19

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Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	ETHANE	1.46	-585	100.0%	D
0th Moment	ETHENE	1.04	-297	100.0%	D
First Moment	ETHANE	0.36	-252	100.0%	D
First Moment	ETHENE	0.31	-28	100.0%	D
Second Moment X	ETHANE	0.36	92	100.0%	ı
Second Moment X	ETHENE	0.41	-212	100.0%	D
Second Moment Y	ETHANE	0.69	-184	100.0%	D
Second Moment Y	ETHENE	0.72	-132	100.0%	D

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.30 Saturated Thickness: Uniform: 84 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

Note: The Sigma XX and Sigma YY components are estimated using the given field coordinate system and then rotated to align with the estimated groundwater flow direction. Moments are not calculated for sample events with less than 6 wells.

MAROS Version 3.0 Release 352, September 2012

Project: GE Evendale
User Name: CSY
Location: Evendale
State: Ohio

User Defined Site and Data Assumptions:

Hydrogeology and Plume Information:

Groundwater Seepage Velocity: 1291 ft/yr Current Plume Length: 2400 ft Current Plume Width: 450 ft

Number of Tail Wells: 32 Number of Source Wells: 8

Down Gradient Information:

Distance from Edge of Tail to Nearest:

Down-gradient Receptor: 3300 ft Down-gradient Property: -2650 ft

Distance from Source to Nearest:

Down Gradient Receptor: 6500 ft Down Gradient Property: 550 ft

Source Information:

Source Treatment: Pump and Treat NAPL is not observed at this site.

Data Consolidation Assumptions:

Time Period: 6/1/2006 **to** 6/20/2017

Consolidation Period: Quarterly

Consolidation Type: Geometric Mean

Duplicate Average

Consolidation:

ND Values: 1/2 Detection Limit

J Flag Values: Actual Value

Plume Information Weighting Assumptions:

Consolidation Step 1. Weight Plume Information by Chemical

Summary Weighting:

Weighting Applied to All Chemicals Equally

Consolidation Step 2. Weight Well Information by Chemical

Well Weighting:

No Weighting of Wells was Applied.

Chemical Weighting:

No Weighting of Chemicals was Applied.

Note: These assumptions were made when consolidating the historical montoring data and lumping the Wells and COCs.

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Project: GE Evendale

User Name: CSY

Location: Evendale

State: Ohio

1. Compliance Monitoring/Remediation Optimization Results:

Preliminary Monitoring System Optimization Results: Based on site classification, source treatment and Monitoring System Category the following suggestions are made for site Sampling Frequency, Duration of Sampling before reassessment, and Well Density. These criteria take into consideration: Plume Stability, Type of Plume, and Groundwater Velocity.

сос	Tail Stability	Source Stability	Level of Effort	Sampling Duration	Sampling Frequency	Sampling Density
ETHANE	D	PD	L	n mechanism unitl reach sta	No Recommendation	36
ETHENE	PD	PD	L	n mechanism unitl reach sta	No Recommendation	36

Level of Monitoring Effort Indicated by Analysis: Limited

2. Spatial Moment Analysis Results:

Spatial Moment Analysis Summary:

Moment Type	Constituent	Coefficient of Variation	Mann-Kendall S Statistic	Confidence in Trend	Moment Trend
0th Moment	ETHANE	1.46	-585	100.0%	D
0th Moment	ETHENE	1.04	-297	100.0%	D
First Moment	ETHANE	0.36	-252	100.0%	D
First Moment	ETHENE	0.31	-28	100.0%	D
Second Moment X	ETHANE	0.36	92	100.0%	ı
Second Moment X	ETHENE	0.41	-212	100.0%	D
Second Moment Y	ETHANE	0.69	-184	100.0%	D
Second Moment Y	ETHENE	0.72	-132	100.0%	D

Note: The following assumptions were applied for the calculation of the Zeroth Moment:

Porosity: 0.30 **Saturated Thickness:** Uniform: 84 ft

Mann-Kendall Trend test performed on all sample events for each constituent. Increasing (I); Probably Increasing (PI); Stable (S); Probably Decreasing (PD); Decreasing (D); No Trend (NT); Not Applicable (N/A)-Due to insufficient Data (< 4 sampling events); (ND) Non Detect.

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